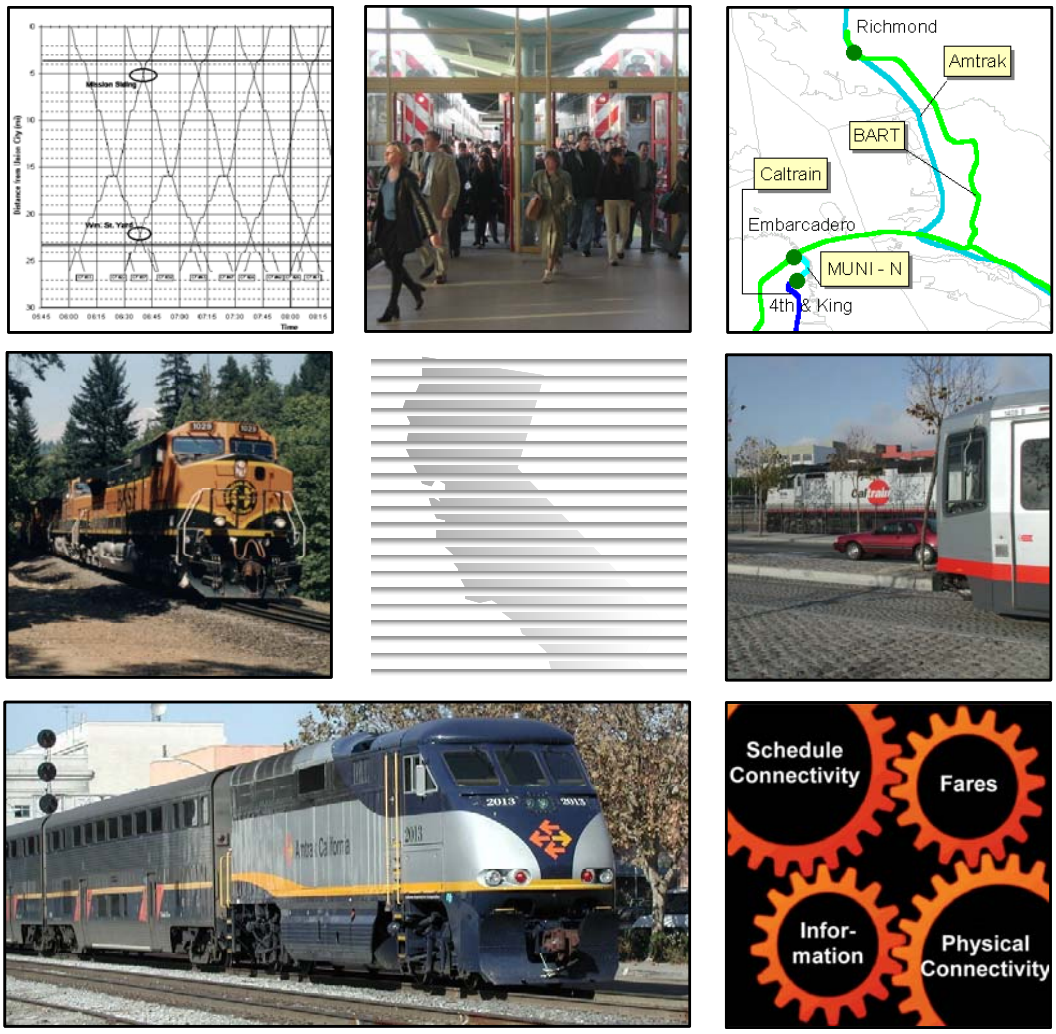
Statewide Rail Transportation Assessment

Revised Draft Report



Prepared by the California Department of Transportation

With Assistance from:

Booz-Allen-Hamilton
Wilbur Smith Associates
System Metrics Group

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EXECUTIVE SUMMARY

The California Department of Transportation (Department) in consultation with the Office of Planning and Research (OPR) has conducted a statewide rail transportation assessment as required by Chapter 597, Statutes of 2001 (AB 1706 - Committee on Transportation) and Chapter 127, Statutes of 2000 (AB 2866 - Migden) (See Appendix A).

In his signing message on AB 2866, Governor Davis stated that the assessment should not address recommendations for projects directly supporting private freight rail capital needs. He directed that any rail capital recommendations made as part of the assessment be limited to those that are the proper subject of State funding (i.e. recommendations that benefit passenger rail services or publicly-owned freight rail facilities). The statewide rail transportation assessment fully addresses the two assembly bills consistent with the Governor's direction.

Key findings are included for:

- rail connectivity.
- track congestion.
- capital improvement plans.
- the cost effectiveness of rail investments.

As directed by statute, recommendations are made in the following two areas:

- Improving rail connectivity:
  - ♦ filling identified gaps in physical connectivity
  - ♦ performing schedule coordination improvements
  - ♦ capitalizing on recent technology advances to improve fare coordination
  - ♦ increasing connectivity information dissemination
- Providing congestion relief: identifying projects for new track, speed improvements and capacity improvements.

In today's environment of a fully connected but congested highway system, multi-modal solutions are necessary to address increasing levels of traffic congestion, particularly in the metropolitan areas of the State. At the same time, passenger rail connectivity needs improvement in order to optimize the effectiveness of the rail transportation mode. The analysis has shown that rail investments are similar in cost effectiveness to highway investments, indicating their important contribution of public benefits.

Key findings and recommendations by major focus area are summarized below. Technical appendices supporting these findings are available from the Department upon request.

Rail Connectivity

Physical Connectivity

Over the next ten years, infrastructure improvements will greatly improve physical rail connectivity in the Sacramento region and the San Francisco Bay Area (Bay Area). The biggest change is expected in the South San Francisco Bay Area. The San Francisco Bay Area Rapid Transit District (BART) extension to San Jose; the Santa Clara Valley Transportation Authority (VTA) extension to Milpitas currently under construction where VTA will connect with BART when the BART extension is completed; and the VTA extension to the San Jose Diridon Station, which is served by Caltrain, Amtrak, and Altamont Commuter Express (ACE), will greatly multiply direct rail connection options in those regions.

Neither Southern California nor the San Joaquin Valley will see markedly improved physical rail connectivity over the same period.

Twelve major direct connectivity gaps between rail systems have been identified in the State and are listed in the table on the following page. Filling these gaps would provide passengers with opportunities to transfer directly between rail systems without having to make multiple intermediate transfers. Various studies have shown that riders are generally reluctant to make multiple transfers in order to reach their destinations and will instead decide to use other modes. Such transfer requirements make rail a less practical travel option and contribute to highway congestion.

Two of these are scheduled to be addressed between now and 2012:

- The Sacramento Regional Transit (RT) light rail connection to the downtown Sacramento Amtrak station.
- The BART extension from Fremont to VTA light rail in Milpitas and to VTA, Caltrain, Amtrak and ACE in San Jose. The extension of VTA to Milpitas is currently under construction and the extension of VTA to the station in San Jose is in the planning stages.

In addition, the BART extension currently under construction from San Francisco/ Colma to San Francisco International Airport and Caltrain service in Millbrae will fill another identified rail gap.

Today, only one airport is within walking distance of a train station, the Burbank Airport Station, which serves the Amtrak Surfliner and Metrolink routes. By 2012, between four and seven airports will have connections to rail systems.

Subject to the availability of funding and the identification of sufficient ridership demand, the State, in cooperation with the federal, local, and regional governments, and rail operators, should work to address the physical connectivity gaps identified. Implementation priorities will be established by local entities for commuter and urban rail systems through their Regional Transportation Plans (RTPs) and Regional Transportation Improvement Programs (RTIPs), as approved by the California Transportation Commission (CTC). For intercity rail, the Department establishes priorities through the Interregional Transportation Improvement Program (ITIP), again as approved by the CTC.

Region	Between	And	Distance
Sacramento Area	**Sacramento** Amtrak Station serving Capitol Corridor San Joaquin Coast Starlight California Zephyr	**Sacramento** (St. Rose of Lima Park station) RT Light Rail	**0.4 miles**
San Francisco Bay Area	**Emeryville** Amtrak Station serving Capitol Corridor San Joaquin Coast Starlight California Zephyr	**San Francisco** Embarcadero Station serving BART and Muni	**8.4 miles**
	San Francisco Caltrain Station	**San Francisco** Powell Street Station serving BART and Muni	**1 mile**
	Pleasanton Altamont Commuter Express (ACE) station	**Dublin/ Pleasanton** BART station	**4 miles**
	Fremont Amtrak/ACE Station serving Capitol Corridor	**Palo Alto** Caltrain station (via Dumbarton Bridge)	**17 miles**
	Fremont BART station	**Palo Alto** Caltrain station (via Dumbarton Bridge)	**18 miles**
	Fremont BART station	**Milpitas** VTA light rail	**12 miles**
	Fremont BART station	**San Jose** Caltrain station	**19 miles**
	Fremont BART station	**San Jose** VTA station	**16 miles**
	Antioch/Pittsburg Amtrak Station	**Pittsburg/ Bay Point** BART Station	**9 miles**
Southern California	**Bakersfield** Amtrak station serving the San Joaquins	**Los Angeles** Union Station serving Amtrak's Pacific Surfliners, Coast Starlight, Southwest Chief, Sunset Limited; Metrolink; Metro Rail Red Line	**110 miles**
	Norwalk MTA Green Line station	**Santa Fe Springs** Metrolink station	**2.6 miles**

Schedule Coordination

Residents of dense urban areas are generally the best served in terms of schedule coordination. This is because high demand allows rail transit services to run more frequently, thus making them easier to coordinate. When at least one leg of a one-transfer rail trip is by an urban rail service (light rail, such as the San Diego Trolley, or heavy rail, such as BART), wait times are generally not very long due to the high frequency of urban rail trains.

Some of the most difficult connections in terms of schedule coordination involve transferring between commuter rail services or between a commuter rail service and an Amtrak California (intrastate) train (Pacific Surfliner, Capitol Corridor or San Joaquin). The reason for this is that these services do not run frequently enough to ensure that transfer times be reasonably brief. Without purposeful schedule coordination, many of these connections will by chance involve long wait times. For many key connections, at certain times of day wait times can be longer than an hour and for some they can be longer than two hours.

The only commuter rail station served by Amtrak California San Joaquin trains is the Stockton ACE station. This station could potentially provide a connection between the South Bay Area, which is served by ACE but not the San Joaquin, and the San Joaquin Valley cities south of Stockton (e.g. Fresno, Bakersfield), which are served by the San Joaquin train but not ACE. The two services, however, miss connections with each other. ACE trains are scheduled for commuters, leaving Stockton before 6 AM and arriving in Stockton after 6 PM, while San Joaquin trains are scheduled for longer distance leisure and business travel and serve Stockton at various times throughout the day.

Other difficult connections in terms of schedule coordination involve taking an Amtrak long distance (interstate) train for at least one leg of the trip and an Amtrak long distance, Amtrak California (State-supported intrastate services consisting of the Pacific Surfliner, San Joaquin, and Capitol Corridor) or commuter rail train for the other leg of the trip. The reason for this is that the Amtrak long distance services provide, at most, one train per day per direction and Amtrak California and commuter trains (with typical headways of one to two hours, especially off-peak) do not run frequently enough to make up for the infrequency of Amtrak long distance trains. Also, Amtrak's long distance trains are not as reliable in terms of schedule adherence as the Amtrak California and commuter trains, as they come long distances from their origination points – such as Chicago.

In the case of the Amtrak Coast Starlight service, most regional rail and other Amtrak long distance service connections in Los Angeles and the Bay Area are missed entirely. The Coast Rail Coordinating Council has proposed the addition of State-supported Coast Route service between San Francisco and Los Angeles. This service would help to provide key connections with commuter rail services (e.g. making rail trips possible between the Central Coast and San Bernardino or Riverside, and the Capitol Corridor to Sacramento).

Schedule coordination can be difficult, however, due to the need to schedule each train and type of service according to market demand from non-transferring passengers as well. Where the transfer involves an Amtrak long distance train, coordination is even

more difficult because these trains are not as reliable in terms of schedule adherence because of the longer distances they travel, as the Amtrak California and commuter trains. The respective rail agencies should work together to analyze demand for transfers and to schedule trains to facilitate such transfers, while maintaining overall passenger convenience.

It is recommended that rail operators work to improve the coordination of schedules, particularly to facilitate transfers between trains with less frequent service (Amtrak long distance, Amtrak California and commuter trains), as these transfers now tend to require the longest wait times. The Department will take a leading role to ensure the maximum possible schedule coordination between the State-supported intercity rail routes, and between such routes and long distance and commuter rail services.

Fare Coordination

Currently, fare coordination between agencies is limited. However, this situation will improve shortly in the Bay Area and Los Angeles with the introduction of the TransLink and Universal Fare System regional fare programs in each region, respectively. Other similar region-wide fare integration efforts should be undertaken where feasible. Also, intercity (Amtrak) rail services could participate in these regional programs to increase statewide fare coordination and promote ridership. The Department, the Southern California Regional Rail Authority, and Amtrak are currently working together to integrate Pacific Surfliner and Metrolink fares in Southern California, and this effort could be expanded to other operators or incorporated into the Universal Fare System program. The Department will continue its efforts to integrate fares between its State-supported Amtrak services and commuter rail services throughout California.

Connectivity Information Dissemination

The study found that the most comprehensive existing sources for transit connection information are the websites that provide general passenger information for all transit operators within a given geographic area. The most developed of these is transitinfo.org, which is supported by the Metropolitan Transportation Commission (MTC) in the Bay Area. The website contains maps, schedules, and links to individual rail operator websites. All regions should develop such comprehensive transit information websites. The Department will provide links from its statewide rail website to regional and rail operator websites and will continue to work with commuter rail operators to provide enhanced real-time information at stations where passengers can connect between Amtrak intercity and commuter rail services.

Given that not everyone has access to the internet, other sources of connection information need to be improved. Rail operators generally do not provide their telephone customer service agents with complete lists of connecting rail and transit services, limiting the ability of agents to assist the public. Some agencies list connecting rail and other transit services with phone numbers in printed pamphlets, but do not provide maps showing connection points. Others provide maps that depict transfer stations but do not provide any other information on connecting services, such as schedules.

Information provided within stations also varies widely. Some agencies have begun to address this problem by developing real-time passenger information displays within stations. Such systems typically display current information on the status and projected arrival time of the next train, but they could potentially be utilized to display information on train connections available at different stations as well. Real-time information systems have the potential to provide a particularly needed service at rural and unstaffed stations, where the lack of a station agent means that passengers have no other source of current information. Operators should work to make telephone information, printed materials, real-time passenger information, and other information sources more useful to connecting passengers.

Track Congestion

Statewide, approximately $4.7 billion worth of track congestion relief project needs over the next ten years have been identified by public passenger rail operators and public agencies that own freight rail facilities (e.g. ports); $1.0 billion in projects are funded, and $3.7 billion worth of projects are unfunded. Current track congestion levels and chokepoints, combined with the expected growth in rail services, require expanded rail systems and infrastructure improvements, (i.e. higher speeds, new track and more capacity improvements). The needs are inclusive of all track congestion projects the operators and the other sources identified above. For the purposes of this assessment, the study considered that the project totals identified reflect local needs and priorities. Actual costs may differ from the amounts stated in agency plans. The needs figures do not necessarily reflect any programming of funds or potential for return-on-investment.

A survey of the freight railroads conducted as part of this assessment identified the worst track congestion problems to be in the Los Angeles region between Los Angeles and San Bernardino/Riverside on both the Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) due to heavy passenger and freight volumes. In addition, track congestion problems were identified between Gilroy and Fremont and between Stockton and Modesto.

The following are recommendations and findings regarding track congestion:

- At various locations throughout the State, the rail system is running out of capacity and existing freight demand is causing delays to passenger rail services. Expected growth in freight and passenger services will require expanded rail infrastructure in the future.
- $3.7 billion to cover the cost of all currently identified but unfunded track congestion needs in California should be provided and spent over the next ten years.
- Subject to the availability of funding, it is recommended that the State, in cooperation with the federal, local, and regional governments, and rail operators, work to address the track congestion issues identified.

Capital Improvement Plans

Capital plans identified for California, either noted in agency documents or reported by agencies and publicly owned freight rail facilities or their operators total $16.2 billion. This amount includes both funded ($9.8 billion) and unfunded ($6.4 billion) needs. Slightly less than half of the unfunded needs, or $2.8 billion, are identified for the short term [by Fiscal Year (FY) 2005]. The balance of $3.6 billion makes up the

FY 2005-2011 need. Urban and light rail projects account for 52 percent of the total dollar value of all identified funded and unfunded needs, followed by intercity rail at 25 percent and commuter rail at 20 percent. Passenger service (e.g. new rolling stock, stations, and rail extensions) and capacity projects, such as double tracking and new sidings, account for nearly 94 percent of dollar value for all identified projects. As with track congestion projects, actual costs for capital improvement plans may differ from the amounts stated in agency plans.

State money represents only one-third of overall rail funding in California, with the State Transportation Improvement Program's Regional Improvement Program (STIP-RIP) and the Traffic Congestion Relief Program (TCRP) being the most important State sources. State funds are supplemented by a number of dedicated and discretionary federal and local sources.

Federal funds come primarily from the Federal Transit Administration for urban and commuter rail systems. Intercity rail (e.g. Amtrak Capitol Corridor, Pacific Surfliner, and San Joaquin) projects, however, are generally not eligible for federal capital funds. However, station projects sponsored by cities and counties, and track and signal projects sponsored by commuter rail agencies that benefit both commuter and intercity rail services are eligible for federal funding. Congress is currently considering legislation to provide a source of federal funding for intercity rail capital projects.

Local funding sources have grown with the passage of transportation sales tax measures in several counties. However, the relatively new requirement that dedicated transportation sales tax measures must receive a two-thirds majority vote for passage or renewal makes future approvals of such taxes more challenging.

Unfunded Operating Needs

Short Range Transportation Plans and other documents were reviewed to determine unfunded operating needs for all rail operators statewide. Three agencies (BART, Muni, and Metrolink) identified a total shortfall of $199 million for existing services. Agencies attempt to bridge shortfalls by increasing fares, containing costs, and/or finding new funding sources; otherwise they must reduce services to match available funds.

In addition to the identified deficits for existing services, various proposed new services also have unfunded operating needs. The amount of operating funding that would be required is, for most of these proposed new services, unknown at this time.

Although most agencies with existing rail services did not identify unfunded operating needs, this does not necessarily mean that operating funding levels, and therefore service levels, are optimal relative to passenger demand. If more operating funding were available, rail operators would likely provide more service.

Cost Effectiveness of Rail Investments

This review offers several conclusions regarding the cost effectiveness of current funding for rail projects:

- As a whole, California rail investments are cost effective as measured by the California Life-Cycle Benefit/Cost Model (Cal-B/C). Rail projects are about equal in cost effectiveness to highway projects (with an average benefit-cost ratio of 2.3 versus 2.4, respectively – a benefit-cost ratio of 1.0 would be the break-even point between costs and benefits), but they also generate a number of public benefits that are difficult to quantify.
- Some enabling investments, such as the construction of new stations or the rehabilitation and maintenance of existing track and facilities, do not generate user benefits that the Cal-B/C model addresses. However, such improvements are essential to improve customer service and satisfaction and result in higher ridership and revenue.
- From a benefit-cost standpoint, the most cost effective investments appear to be those with relatively low capital costs and those that benefit multiple rail services.
- Track capacity projects provide the best benefit-to-cost ratio compared to passenger service and public safety projects. However, the track capacity projects included in the analysis are largely low-cost projects in rural areas, and not high-cost urban area projects requiring tunneling or new structures.
- California rail services recover a reasonable portion of their operating costs: 44 percent for commuter rail services, 47 percent for urban rail, and from 38 to 53 percent for intercity rail services.
- In recent years, ridership has grown faster than the increase in the level of service (in terms of rail vehicle miles). The level of service grew about 25 percent in the past five years, while ridership increased about 35 percent. If this trend continues, it should improve farebox recovery ratios in California, but it may also lead to overcrowding.

1. INTRODUCTION

Railroads have served California for well over 100 years. From the 1860s to the present, they have served passengers and shippers of thousands of commodities in virtually all parts of the State, and have linked California with the rest of the nation.

Governor Gray Davis acknowledged the importance of rail transportation in the State of California by stating, "Rail is a vital component of California's transportation system. Increasingly, it represents the most efficient and practical means of reducing congestion in our urban transportation corridors."

The California Department of Transportation (Department), in consultation with the Office of Planning and Research (OPR), has conducted a statewide rail transportation assessment as required by Chapter 597, Statutes of 2001 (AB 1706 - Committee on Transportation) and Chapter 127, Statutes of 2000 (AB 2866 - Migden) (see Appendix A).

The rail assessment was conducted in cooperation with regional and local transportation agencies as well as freight railroads, and addresses both passenger and freight rail systems. Passenger rail systems include intercity, commuter, and urban rail systems. Freight rail systems include Class I railroads, short line, and terminal railroads (public and private), and port facilities.

The assessment addresses five directives from the legislation:

RAIL CONNECTIVITY - Examine how the different modes of rail transportation interconnect with each other. Identify gaps in connectivity between passenger rail systems and make recommendations for improving connectivity.

TRACK CONGESTION - Identify high levels of freight and passenger rail track congestion. Identify where entities project future rail congestion problems and make recommendations for capital projects to alleviate or prevent track congestion.

PLANS FOR CAPITAL PROJECTS - Report on plans for capital projects for each rail transportation agency over the next ten years and identify where plans for capital improvements or services by one rail agency will conflict with plans for capital improvements or services of another rail agency.

COST EFFECTIVENESS - Examine the cost effectiveness of current funding for rail projects.

UNFUNDED NEEDS - Estimate and document statewide unfunded capital and operating needs over the next ten years for respective agencies.

In his signing message on AB 2866, Governor Davis stated that the assessment should not address recommendations for projects directly supporting private freight rail capital needs. He directed that any rail capital recommendations made as part of the assessment be limited to those that are the proper subject of State funding, those that benefit passenger rail services, or publicly-owned freight rail facilities.

Sections of the Report

The remainder of this document is organized as follows:

- Section 2, California Rail System – a description of passenger and freight rail services in the State
- Section 3, Rail Connectivity – an assessment of how existing passenger and freight rail services connect with each other and other forms of transportation (physical connectivity, schedule coordination, fare coordination, and connectivity information dissemination).
- Section 4, Track Congestion – an assessment of current and future (ten-year horizon) areas of track congestion affecting public passenger rail operations and publicly owned freight rail services.
- Section 5, Capital Improvement Plans – a report on ten-year plans by public passenger rail operators and public agencies that own freight rail facilities, and the identification of unfunded ten-year capital needs in California and of any conflicts between the plans.
- Section 6, Unfunded Operating Needs – an estimate of statewide unfunded operating needs over the next ten years for existing and proposed rail services.
- Section 7, Cost Effectiveness of Rail Investments – an overview of rail funding in California and an examination of the cost effectiveness of current funding for rail capital projects.

Technical appendices documenting the research and supporting the findings are available from the Department upon request.

2. CALIFORNIA RAIL SYSTEM

The following short description of the passenger and freight systems in California provides a framework for the Statewide Rail Assessment.

2.1 Rail Passenger Systems

California has a varied network of rail services. These rail services provide transportation options in urbanized and rural areas of the State for residents and visitors alike. There are several types of rail services in the State: urban rail, commuter rail, Amtrak California (intrastate) rail, and Amtrak long distance (interstate) rail.

Urban Rail Systems

Urban rail systems serve primarily local transportation needs. These systems are shown in the following table.

System	Heavy Rail	Light Rail	Cable Cars
Los Angeles County Metropolitan Transportation Authority (LACMTA)	X	X	
Sacramento Regional Transit District (RT)		X	
San Diego Metropolitan Transit Development Board (MTDB/San Diego Trolley)		X	
San Francisco Bay Area Transit District (BART)	X		
San Francisco Municipal Railway (MUNI)		X	X
Santa Clara Valley Transportation Authority (VTA)		X	

Heavy Rail operates on exclusive right-of-way (no cross traffic), usually grade-separated (elevated or in subway), although tracks can be at grade if protected. This mode utilizes rail cars driven by electric power usually drawn from a third rail. Platforms are raised to allow floor-level entry into the vehicles.

Light Rail operates on predominately exclusive right-of-way, but also in mixed traffic. Tracks are sometimes grade-separated. This mode primarily utilizes vehicles electrically propelled by overhead catenary wire. Platforms can be either at street level or raised to allow floor-level entry into the vehicles.

The urban rail systems operate over track that they own. They generally do not share track with freight operators, although the San Diego Trolley route allows freight operations during non-revenue hours.

Commuter Rail Systems

Commuter rail operators serve regional and local transportation needs. They utilize tracks either that they or a freight railroad own. In the latter case, the track is leased from the freight railroad or accessed via trackage rights. Generally, commuter services share track with freight services. These systems include Altamont Commuter Express Joint Powers Authority (ACE), North County Transportation District (NCTD Coaster), Peninsula Corridor Joint Powers Board (Caltrain), and the Southern California Regional Rail Authority (Metrolink).

During the late 1980s and early 1990s, freight railroads and various public agencies in California engaged in negotiations for the use of freight rail lines for passenger services. In some cases, the freight railroads sold the lines to the passenger operators, but retained the right to provide freight services on the lines. As a result of these negotiations, capacity improvements were added in various places for new passenger trains, and new passenger services were initiated. Services added during the 1990s included: the Metrolink commuter rail system serving Los Angeles, Ventura, San Bernardino, Riverside, Orange, and Northern San Diego counties; the Coaster commuter rail service between Oceanside and San Diego; Caltrain's commuter rail system extension to Gilroy; and the ACE commuter rail service between Stockton and San Jose.

Amtrak California (Intrastate) Rail Services

Three State-supported intercity rail services are operated by Amtrak. They run between regions of the State, but do not cross state lines. The State-supported services include the Pacific Surfliner (formerly called the San Diegan), the San Joaquin, and the Capitol Corridor. The Pacific Surfliner and San Joaquin are administered by the Department, while the Capitol Corridor Joint Powers Authority administers the Capitol Corridor. One-third of the net variable costs (costs minus ticket revenue) associated with the Pacific Surfliner service are borne by Amtrak, while the State pays two-thirds of the net costs of this service and all net costs associated with the San Joaquin and Capitol Corridor.

Amtrak Long Distance (Interstate) Rail Services

Amtrak operates several long distance intercity rail services that have a portion of their route in California: the California Zephyr, Coast Starlight, Southwest Chief, and Sunset Limited.

Proposed High Speed Rail System

In 1996, the California High Speed Rail Act founded the California High Speed Rail Authority (CHSRA) to direct the development and implementation of intercity high-speed rail service. The Authority's June 2000 business plan*, Building a High Speed Train System for California*, found that a high-speed train system is a smart investment in mobility, an evolutionary step for transportation, and a project in keeping with California's standards for environmental quality and economic growth. The Authority determined that the next step in the development of the project is to proceed to develop a program environmental impact report (EIR). The EIR is expected to be completed in 2003-04.

As currently proposed, the high speed rail system would be capable of speeds of 200 mph and would provide the following service:

- 2 1/2 hours express San Francisco - Los Angeles
- 2 hours express San Jose - Los Angeles
- 1-hour express Los Angeles - San Diego by Inland Route
- 1 1/2 to 2 hours Los Angeles - San Diego by Coast Route

The system would be completely electrified, with the exception of the segment between Los Angeles and San Diego along the coast, where trains would be powered by diesel engines.

California Maglev Project

Maglev refers to magnetic levitation, in which magnetic forces lift, propel, and guide a vehicle over a guideway. The initial corridor study area of the California Maglev Project extends from Los Angeles International Airport to Union Station in downtown Los Angeles, then further east to Ontario International Airport and March Field in Riverside County, a distance of approximately 85 miles. The system is planned to be located in existing freeway or railroad rights-of-way, generally following the I-10 corridor from Los Angeles International Airport to San Bernardino/Riverside. The Southern California Association of Governments and the California Business, Transportation and Housing Agency are the project sponsors.

The California Maglev Project has significant hurdles to overcome. Additional engineering and environmental assessment is required to detail the initial concept design plans. Extensive coordination will be required with the Department, railroad operators, and local agencies along the corridor.

2.2 Rail Freight Systems

Freight movements are vitally important to the economic health of the State of California. Railroads have moved freight since their inception in the 1860s. In the 1980s and 1990s, the California railroad industry underwent consolidations and restructuring.

Today three classes of railroads serve California: Class I railroads, with annual revenues exceeding $262 million; Class II regional railroads, with annual revenues between $40 million and $262 million; and Class III short line railroads, with annual revenues of less than $40 million.

Class I Railroads

Two Class I carriers, the UP and the BNSF, serve the State of California.

Union Pacific Railroad. The UP is by far the largest railroad in the State, operating on 3,776 miles of track including trackage rights. Main line routes are typically part of the railroad's interstate and transcontinental systems. In California, the UP system is made up primarily of three historic railroad properties: the historic UP, with a main line running between Southern Nevada and Southern California; the former Southern Pacific (SP), with main and branch lines that at one time reached virtually every corner of the State; and the former Western Pacific (WP), with a main line running between Northern Nevada and the Bay Area; and several branch lines in the San Joaquin Valley.

Burlington Northern Santa Fe Railway. The BNSF is the second largest railroad in California. BNSF operates on 1,783 miles of railroad in the State including trackage rights. BNSF is a product of the combination of the former Burlington Northern (BN) Railway and the former Atchison, Topeka and Santa Fe (ATSF) Railway in 1995. Before that time, ATSF operated in the Bay Area, the San Joaquin Valley, and Southern California. BN had a line running from the Oregon State line to a junction with the former WP in Bieber in northeastern California. This line was the only California segment of the former Great Northern Railway (GN), which became part of the BN at its formation in 1970.

Class II Regional Railroad

The only such railroad operating in California is the Central Oregon and Pacific Railroad which serves 53 miles of track in California.

Class III Short Line Railroads

The 30 short line railroads in California play an important role in moving goods to and from the State's regions and local communities. They provide switching services and/or short distance transportation of general carload (i.e. non-intermodal) freight for the various customers along their route. They also provide through-traffic to the Class I carriers for longer hauls. The commodities moved tend to have a low transportation cost to weight/volume ratio, which contributes to their attraction to rail service versus transport by trucks.

Short line railroads play an important role in moving goods to and from California seaports and rural regions. The commodities they carry tend to have a low transportation cost to weight ratio, which makes them more attractive than transportation by truck when low cost is more important than time for shippers. The short lines provide switching services and interchange traffic with Class I railroads for transportation to the rest of the United States.

Publicly Owned Freight Railroads

Publicly owned freight railroads are rail lines owned by public agencies (e.g. seaports and local transportation agencies). The operation of freight rail services on these public railroads is typically contracted out to private railroad operators. There are nine freight railroads owned by public agencies in California. They are:

1. The Harbor Belt Line Railroad, owned by the Ports of Los Angeles and Long Beach
2. The Alameda Corridor from Long Beach to Los Angeles, owned by the Alameda Corridor Transportation Authority (ACTA)
3. The San Diego Arizona Eastern Railroad, owned by Metropolitan Transit Development Board
4. The Port of Oakland Joint Intermodal Terminal
5. The Stockton Public Belt Railroad, serving the Port of Stockton
6. The Yolo Port District Belt Railroad, serving the Port of Sacramento
7. The Northwestern Pacific Railroad, owned by the North Coast Rail Authority
8. The Lake County Railroad, owned by Lake County, Oregon, and extending south to Alturas, California
9. The Santa Paula Branch Line, owned by the Ventura County Transportation Commission (VCTC) in Ventura County

3. RAIL CONNECTIVITY

Rail connectivity is comprised of four separate elements:

- Physical connectivity – the degree to which different modes of passenger rail services physically interconnect with each other.
- Schedule coordination – the extent to which schedules for rail systems in California are set as such that both wait times for transferring passengers and the chances of missing connections due to late trains are minimized.
- Fare coordination – the extent to which the fare systems of passenger rail services in California are compatible with those of other passenger rail services and other connecting modes.
- Connectivity information dissemination – the level of information on connections provided to users that need to transfer between rail systems, or connect between a rail system and another mode of transportation.

The assessment addresses each type of connectivity. The detailed analysis and documentation that form the basis for this section are contained in Appendices C-F, which are available upon request from the Department's Division of Rail.

3.1 Physical Connectivity

The term rail station "connectivity pairs" describes the physical connection a passenger must make to transfer between two separate rail systems in the same city or to a nearby location. The major rail station connectivity pairs were examined as part of this rail assessment. Overall results by region are presented in the tables below for 2002 and 2012.

Table 1 – Direct Rail Connectivity Summary Matrix 2002

Region	Total Connectivity Pairs	Distance of Connection			
		Same Station or less than 1/8 mile	Less than 1/4 mile	Less than 1/2 mile	More than 1/2 mile
Sacramento Area	3	33%	0%	67%	0%
San Francisco Bay Area	33	27%	9%	9%	55%
San Joaquin Valley	5	20%	0%	0%	80%
Greater Los Angeles Area	11	55%	0%	0%	45%
San Diego Region	5	100%	0%	0%	0%

Table 2 – Direct Rail Connectivity Summary Matrix 2012

Region	Total Connectivity Pairs	Distance of Connection			
		Same Station or less than 1/8 mile	Less than 1/4 mile	Less than 1/2 mile	More than 1/2 mile
Sacramento Area	3	100%	0%	0%	0%
San Francisco Bay Area	33	61%	12%	0%	27%
San Joaquin Valley	5	20%	0%	0%	80%
Greater Los Angeles Area	11	55%	0%	0%	45%
San Diego Region	5	100%	0%	0%	0%

Amtrak operates dedicated bus connections to transport passengers between an Amtrak rail station and other rail services or a major intermodal station. These bus connections link six of the 33 connectivity pairs in the Bay Area and four out of five in the San Joaquin Valley. They appear as connections of greater than one-half mile in the tables because they do not provide a direct rail-to-rail connection within this one-half mile distance.

As shown in the tables, between 2002 and 2012, infrastructure improvements will greatly improve physical rail connectivity in Northern California. In the Sacramento Region, all rail-to-rail connection points will be within the same station or less than a one-eighth mile walk by 2012, compared to only 33 percent now. In the San Francisco Bay Area, 61 percent of such connection points will be in the same station or less than a one-eighth mile walk by 2012, compared to only 27 percent now. Of these, the biggest change is expected in the South San Francisco Bay Area. The BART extension to San Jose; the Santa Clara Valley Transportation Authority (VTA) extension to Milpitas (under construction), where VTA will connect with BART when the BART extension is completed; and the VTA extension to the San Jose Diridon Station, which is served by Caltrain, the Capitol Corridor, and ACE, will greatly multiply direct rail connection options in the region.

Neither Southern California nor the San Joaquin Valley will see markedly improved physical rail connectivity over the same period.

Parts of rural California can be reached either by an Amtrak long distance (interstate) train or via Amtrak buses that connect to Amtrak California (intrastate) trains. However, the number of Amtrak stations and lines is limited, the service is infrequent, and passengers have few choices for rail travel.

Twelve major direct connectivity gaps between rail systems were identified as part of the analysis. Filling these gaps would provide passengers with opportunities to transfer directly between rail systems without having to make multiple transfers. Various studies have shown that riders are generally reluctant to make multiple transfers in order to reach their destinations and will instead decide to use other modes. Such transfer requirements make rail a less practical travel option and contribute to highway congestion. The identified gaps (highlighted in Exhibits 1-4 on the next few pages) are shown in the following table:

Table 3 – Direct Rail Connectivity Points

Region	Between	And	Distance
Sacramento Area	**Sacramento** Amtrak Station serving Capitol Corridor San Joaquin Coast Starlight California Zephyr	**Sacramento** (St. Rose of Lima Park station) RT Light Rail	**0.4 miles**
San Francisco Bay Area	**Emeryville** Amtrak Station serving Capitol Corridor San Joaquin Coast Starlight California Zephyr	**San Francisco** Embarcadero Station serving BART and Muni	**8.4 miles**
	San Francisco Caltrain Station	**San Francisco** Powell Street Station serving BART and Muni	**1 mile**
	Pleasanton Altamont Commuter Express (ACE) station	**Dublin/ Pleasanton** BART station	**4 miles**
	Fremont Amtrak/ACE Station serving Capitol Corridor	**Palo Alto** Caltrain station (via Dumbarton Bridge)	**17 miles**
	Fremont BART station	**Palo Alto** Caltrain station (via Dumbarton Bridge)	**18 miles**
	Fremont BART station	**Milpitas** VTA light rail	**12 miles**
	Fremont BART station	**San Jose** Caltrain station	**19 miles**
	Fremont BART station	**San Jose** VTA station	**16 miles**
	Antioch/Pittsburg Amtrak Station	**Pittsburg/ Bay Point** BART Station	**9 miles**
Southern California	**Bakersfield** Amtrak station serving the San Joaquins	**Los Angeles** Union Station serving Amtrak's Pacific Surfliners, Coast Starlight, Southwest Chief, Sunset Limited; Metrolink; Metro Rail Red Line	**110 miles**
	Norwalk MTA Green Line station	**Santa Fe Springs** Metrolink station	**2.6 miles**

Two of these gaps are scheduled to be addressed between now and 2012:

- The Sacramento RT light rail connection to the downtown Sacramento Amtrak station.
- The BART extension from Fremont to VTA light rail in Milpitas and Caltrain/VTA in San Jose. The extension of VTA light rail to Milpitas is currently under construction and the extension of VTA light rail to the Caltrain station in San Jose is in the planning stages.

In addition, the BART extension from San Francisco/Colma to Caltrain in Millbrae, which is currently under construction, will fill another identified rail gap.

Exhibit 1 – Direct Physical Rail Connectivity Gaps

Exhibit 2 – Direct Physical Rail Connectivity Gaps

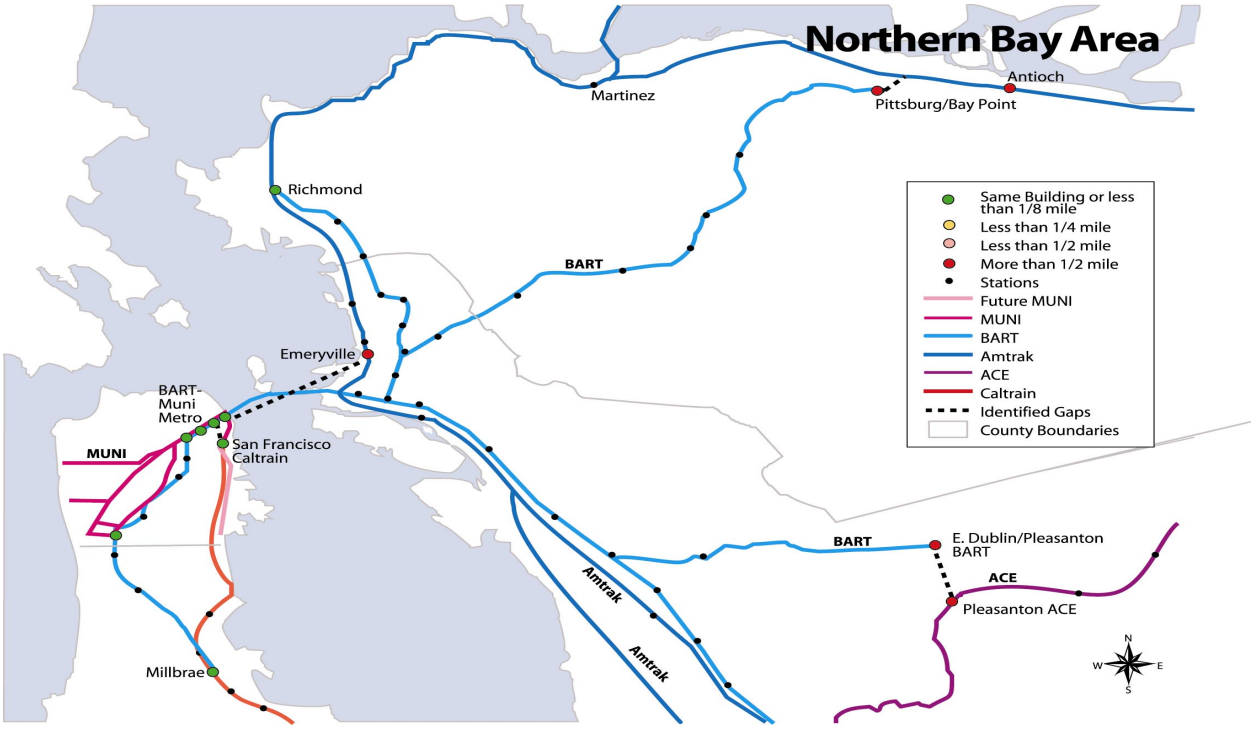


Exhibit 3 – Direct Physical Rail Connectivity Gaps

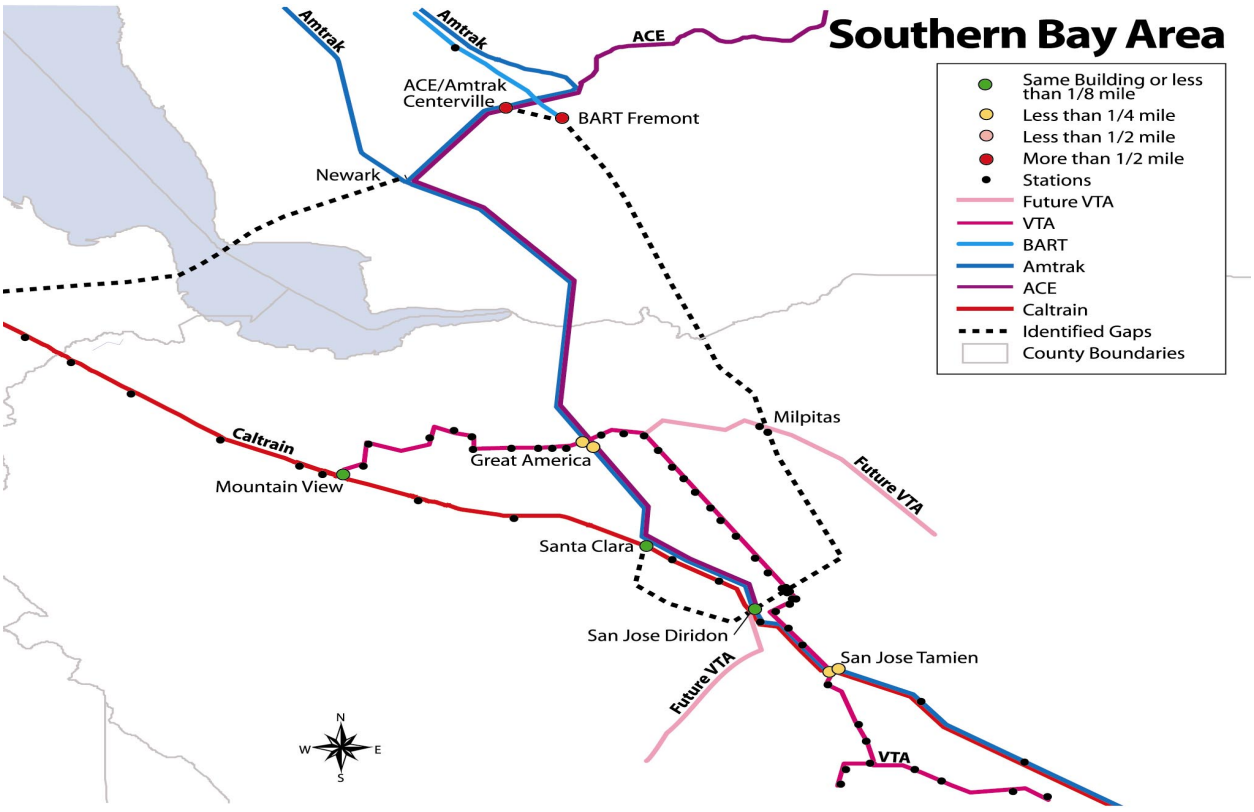


Exhibit 4 – Direct Physical Rail Connectivity Gaps

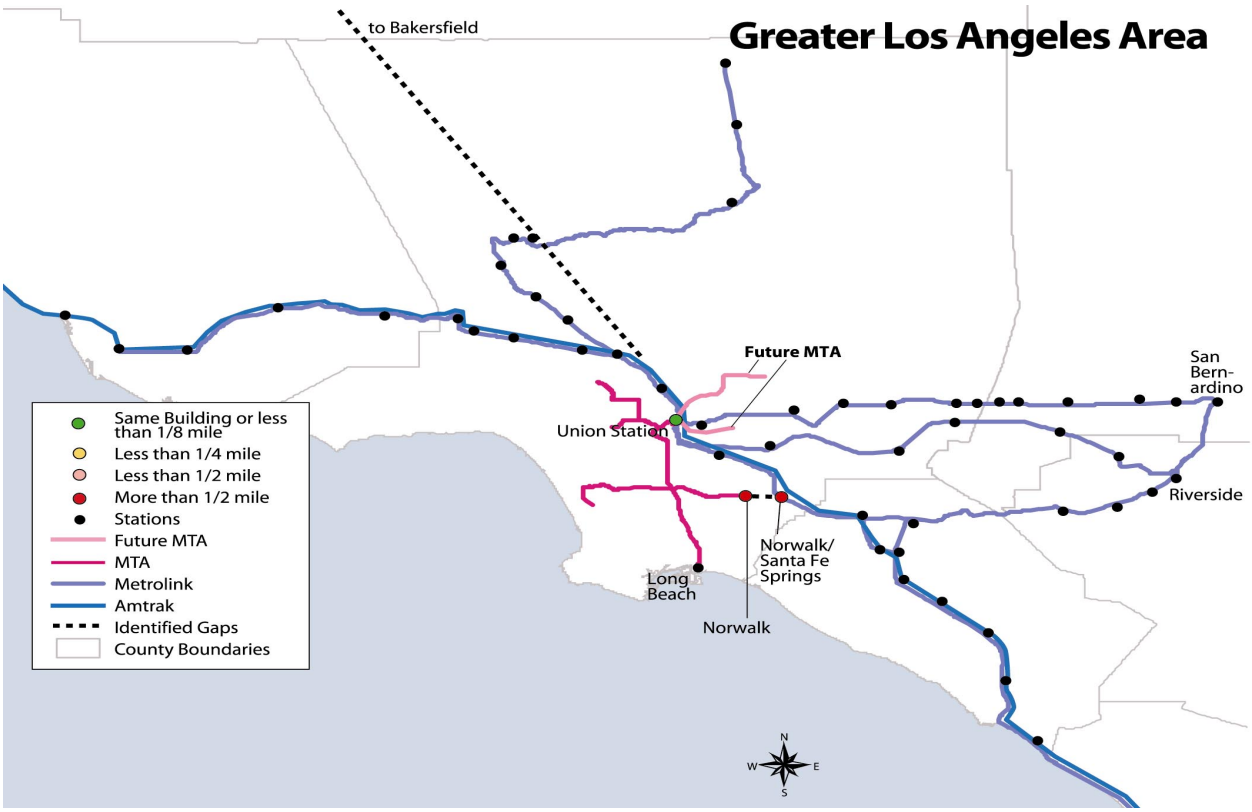
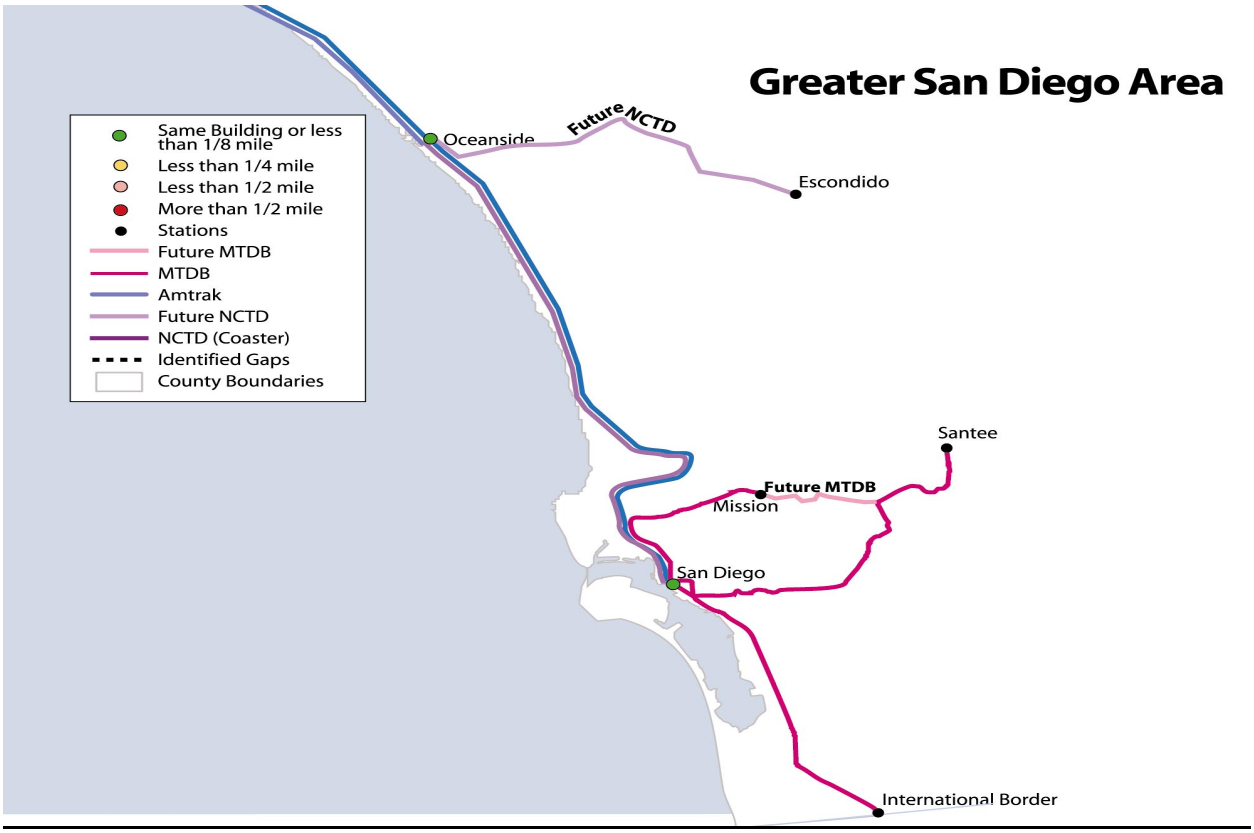


Exhibit 5 – Direct Physical Rail Connectivity Gaps



The Amtrak California system has an extensive network of connecting buses. They provide an important extension to the three routes, connecting them to destinations lacking in rail infrastructure or passenger rail service. In many rural areas of California, this system of connecting buses serves as a vital link to the passenger rail network. For example, a Capitol Corridor connecting bus provides daily service to coastal communities between San Jose and Santa Barbara; and San Joaquin connecting buses provide daily service to coastal communities between Martinez and Eureka/Arcata (this connection is also used by Capitol Corridor passengers) and to Central Valley communities between Stockton/Sacramento and Redding. The San Joaquin has the most extensive connecting bus network of the three Amtrak California routes, and more than half of all San Joaquin riders use one or more buses for a portion of their trip. Amtrak long distance (interstate) trains are also served by some connecting bus routes. The Amtrak California and long distance connecting bus routes function as direct parts of the Amtrak system, with coordinated connections, guaranteed seating, integrated fares and ticketing procedures, and inclusion in Amtrak's central information and reservation system in the same manner as the trains.

Of the rail-to-rail connectivity gaps described above, two are served by coordinated connecting buses. The one between the Emeryville Amtrak station and downtown San Francisco is served by buses meeting the Capitol Corridor, San Joaquin, California Zephyr, and Coast Starlight services (all trains serving the station), while a connecting bus is also provided between the Capitol Corridor/San Joaquin and the San Francisco Caltrain station at 4th and King Streets. The gap between Bakersfield and Los Angeles Union Station is served by connecting San Joaquin buses.

Other coordinated connecting buses include one provided by Livermore Amador Valley Transit (LAVTA) between the Pleasanton ACE station and the Dublin/Pleasanton BART station, and another provided by the Alameda-Contra Costa Transit District (AC Transit) that connects the Fremont Centerville station with the Fremont BART station. The Pleasanton shuttle is free to ACE riders. Its schedule is coordinated with that of ACE and it waits for late ACE trains. The Fremont bus is coordinated with the departures and arrivals of ACE trains.

In terms of the gap identified between the Emeryville Amtrak station and downtown San Francisco, it should be noted that Capitol Corridor and San Joaquin rail passengers can also transfer to BART at Richmond and then take BART to San Francisco. Capitol Corridor passengers traveling to and from the South San Francisco Bay will be able to transfer to BART at the Coliseum station once the Capitol Corridor stop there has been constructed. However, passengers wishing to access the Muni and Caltrain systems in San Francisco will still have to transfer two to three times, respectively (from Amtrak to BART to Muni to Caltrain), or take the connecting bus from Emeryville to Muni or Caltrain.

Rail-to-rail connectivity was the major focus of this analysis. Today, rail-to-air connectivity is poor, as only one airport connection (Burbank-Glendale-Pasadena) has a rail station within walking distance of its terminals. Existing plans call for connecting three airports in the State to a passenger rail system by the year 2012: San Francisco International to BART and to Caltrain by way of a cross-platform transfer from BART; Oakland International to the BART Oakland Coliseum station via people mover (a dedicated-guideway, rubber-tired train within the BART fare system), with a new

Oakland Coliseum Capitol Corridor stop accessible by a one-block long pedestrian bridge from the BART station; and Los Angeles International to the MTA Metro Rail Green Line.

Connections between three additional airports and passenger rail systems have been proposed for completion by 2012, but these projects have not yet been formally adopted: San Jose International via people mover east to the VTA light rail Guadalupe line and west to Caltrain, ACE and future BART and Capitol Corridor service at Santa Clara; Sacramento International to the RT light rail system; and John Wayne Airport in Orange County to the proposed CenterLine light rail project. The San Jose Airport people mover and RT line to Sacramento International are undergoing alternatives analysis, with the people mover and light rail connections each as one of the alternatives being studied, respectively. The Orange County Transportation Authority and its partner cities will decide whether to pursue the CenterLine project once preliminary engineering is completed. If the project is adopted, construction would begin in 2006 according to the current projection.

The one-half mile walking distance connection between Metrolink and Amtrak Pacific Surfliner trains and the Burbank-Glendale-Pasadena Airport may be impacted by the proposed relocation of the airport terminal. Metrolink is exploring the possibility of opening a station on its Antelope Valley line that would be within walking distance of the new terminal. However, the walking-distance connection to the Pacific Surfliner would be lost, although a shuttle bus connection would be provided.

Plans and proposals to provide rail-to-airport connections are summarized in Table 4 below.

Table 4 - California Rail-to-Airport Connections

Airport	Rail System(s)	Direct Connection 2002	Direct Connection 2012
Sacramento International	Sacramento RT	No	Proposed
	Amtrak	No	No
San Francisco International	BART	No	Yes
	Caltrain	No	Yes (by cross-platform transfer from direct BART line without intermediate BART stations)
	Amtrak	No	Yes (by BART at Richmond)
Oakland International	BART	No	Yes (by people mover)
	Amtrak Capitol Corridor	No	Yes (by people mover and pedestrian bridge)
	Amtrak Coast Starlight	No	No
San Jose International	VTA	No	Proposed (by people mover)
	BART	No	Proposed (by people mover)
	Caltrain	No	Proposed (by people mover)
	ACE	No	Proposed (by people mover)
	Amtrak Capitol Corridor	No	Proposed (by people mover)
	Amtrak Coast Starlight	No	No
Fresno-Yosemite International	Amtrak	No	No
Burbank-Glendale-Pasadena	MTA Metro Rail	No	No
	Metrolink	Yes (walking distance)	Proposed
	Amtrak	Yes (walking distance)	No
Los Angeles International	MTA Metro Rail	No	Yes
	Metrolink	No	No
	Amtrak	No	No
Ontario International Airport	Metrolink	No	No
	Amtrak	No	No
John Wayne/Orange County	CenterLine	No	Proposed
	Metrolink	No	No
	Amtrak	No	No
San Diego International	San Diego Trolley	No	No
	Coaster	No	No
	Amtrak	No	No

Subject to the availability of funding and the identification of sufficient ridership demand, the State, in cooperation with the federal, local, and regional governments, and rail operators, should work to address the physical connectivity gaps identified. Implementation priorities will be established by local entities for commuter and urban rail systems through their Regional Transportation Plans and Regional Transportation Improvement Programs, as approved by the CTC. For intercity rail, the Department establishes priorities through the Interregional Transportation Improvement Program, again as approved by the CTC.

3.2 Schedule Coordination

Residents of dense urban areas are generally the best served in terms of schedule coordination. This is because high demand allows rail transit services to run more frequently, thus making them easier to coordinate. When at least one leg of a one-transfer rail trip is by an urban rail service (light rail, such as the San Diego Trolley, or heavy rail, such as BART), wait times are generally not very long due to the high frequency of urban rail trains. For example, passengers connecting between Capitol Corridor trains and BART at Richmond have short wait times due to the high frequency of BART trains.

The most difficult connections in terms of schedule coordination involve transferring between commuter rail services, between a commuter rail service and an Amtrak train, or between Amtrak trains. The reason for this is that these services do not run frequently enough to ensure that transfer times be reasonably brief. Without purposeful schedule coordination, many of these connections will by chance involve long wait times.

Commuter and Amtrak California (Intrastate) Connections

The following is a list of transfer stations and the ranges of weekday transfer times between different commuter trains, and between commuter and Amtrak California trains (Pacific Surfliner, Capitol Corridor), serving those stations. The amount of wait time required within the ranges would depend on the time of day that the transfer is made. Passengers connecting between frequent commuter services expect wait times of 15 minutes or less. Passengers connecting between commuter and Amtrak California trains expect wait times of 30 minutes or less.

An analysis of transfers involving Amtrak long distance trains follows this section.

Table 5 – Range of Transfer Times For Commuter and Amtrak California Connections

Transfer Station	Transfer From	Transfer To	Wait Times (minutes)
Fremont	ACE Westbound	Capitol Corridor Northbound	68 to 80
	Capitol Corridor Southbound	ACE Eastbound	11 to 124
Santa Clara	ACE Westbound	Caltrain Northbound	4 to 23
	Caltrain Southbound	ACE Eastbound	3 to 26
San Jose	Caltrain Northbound (from Gilroy)	Capitol Corridor Northbound	28
	Capitol Corridor Southbound	Caltrain Southbound (to Gilroy)	74
Los Angeles	Metrolink – San Bernardino Line Westbound	Pacific Surfliner Northbound	6 to 20
	Pacific Surfliner Southbound	Metrolink – San Bernardino Line Eastbound	5 to 125
Los Angeles	Metrolink – Riverside Line Westbound	Pacific Surfliner Northbound	52 to 145
	Pacific Surfliner Southbound	Metrolink – Riverside Line Eastbound	30 to 35
Los Angeles	Metrolink – Antelope Valley Line Southbound	Pacific Surfliner Southbound	12 to 145
	Pacific Surfliner Northbound	Metrolink – Antelope Valley Line Northbound	9 to 65
Fullerton	Metrolink – 91 Line (Riverside-Fullerton-Downtown LA)	Pacific Surfliner Southbound	12 to 89
	Pacific Surfliner Northbound	Metrolink – 91 Line (Downtown LA- Fullerton-Riverside)	23 to 48
Santa Ana	Metrolink – Inland Empire-Orange County Line Southbound	Pacific Surfliner Southbound	13 to 76
	Pacific Surfliner Northbound	Metrolink – Inland Empire-Orange County Line Northbound	20 to 64
Oceanside	Metrolink – Orange County Line Southbound	Coaster Southbound	3 to 25
	Coaster Northbound	Metrolink – Orange County Line Northbound	8 to 71 (misses all AM connections)

While many of the wait times at the low ends of the ranges are not very long, such as those that are less than 15 minutes, these good connections are only available at certain times of day. Furthermore, their availability seems to be random and not related to demand: many of the short transfer times exist in the middle of the day and many of the long transfer times are required during peak periods. What this means is that passengers have fairly limited options for making these transfers without having to endure long wait times.

The only commuter rail station served by Amtrak California San Joaquin trains is the Stockton ACE station. This station could potentially provide a connection between the South Bay Area, which is served by ACE but not the San Joaquin, and the San Joaquin Valley cities south of Stockton (e.g. Fresno, Bakersfield), which are served by the San Joaquin train but not ACE. The two services, however, miss connections with each other. ACE trains are scheduled for commuters, leaving Stockton before 6 AM and arriving in Stockton after 6 PM, while San Joaquin trains are scheduled for longer distance leisure and business travel and serve Stockton at various times throughout the day. The Department is working with Metrolink and other commuter rail operators to improve schedule connectivity between Amtrak California trains and commuter trains. Such efforts include establishing schedules that provide new or improved connections as well as the ability to hold trains for a short time if an inbound train is late.

The State is also funding new real-time communication systems that will provide the information needed to facilitate connections.

Amtrak Long Distance (Interstate) Connections

Other difficult connections in terms of schedule coordination involve taking an Amtrak long distance train for at least one leg of the trip. The reason for this is that the Amtrak long distance services provide, at most, one train per day per direction. When the other leg of a one-transfer trip is by an Amtrak California or commuter train (e.g. Caltrain, Metrolink), making the connection can still require a long wait. This is because Amtrak California and commuter trains (with typical headways of one to two hours, especially off-peak) do not run frequently enough to make up for the infrequency of Amtrak long distance trains.

In order to make transferring between Amtrak long distance and Amtrak California or commuter trains more convenient, the respective operators would need to make a conscious effort to coordinate schedules. Such schedule coordination, however, is difficult to arrange because the Amtrak long distance trains are not as reliable in terms of schedule adherence as the Amtrak California and commuter trains. This is particularly the case when the train has come a long distance from its origination point (e.g. a California Zephyr train that has come all the way from Chicago).

The following are the cases where the minimum wait time to transfer between Amtrak long distance and Amtrak California trains is more than one hour.

Table 6 – In-Station Wait times Exceeding 1 Hour For Amtrak Long Distance Train Connections

Transfer Station	Transfer From	Transfer To	Wait Times
Sacramento	Coast Starlight Southbound	California Zephyr Eastbound	5 hrs, 0 min
	California Zephyr Westbound	Coast Starlight Northbound	7 hrs, 34 min
Sacramento	California Zephyr Westbound	San Joaquin Southbound	2 hrs, 5 min
	San Joaquin Northbound	California Zephyr Eastbound	1 hr, 45 min
Martinez	California Zephyr Westbound	San Joaquin Southbound	1 hr, 12 min
Emeryville	Capitol Corridor Northbound	California Zephyr Eastbound	1 hr, 12 min
Los Angeles Union	Pacific Surfliner Northbound	Sunset Limited Eastbound	1 hr, 40 min
Los Angeles Union	Coast Starlight Southbound	Pacific Surfliner Southbound	1 hr, 5 min
Fullerton	Southwest Chief Westbound	Pacific Surfliner Southbound	1 hr, 8 min
	Pacific Surfliner Northbound	Southwest Chief Eastbound	1 hr, 36 min

An issue that makes schedule coordination with Amtrak's Coast Starlight train (providing service between Seattle, Portland, Redding, Sacramento, Oakland, San Jose, San Luis Obispo, and Los Angeles) particularly difficult is that it arrives in Los Angeles and San Jose too late in the evening to make the following rail connections:

- Arriving in Los Angeles, the Coast Starlight misses same-day connections with all six Metrolink lines serving Los Angeles Union Station.
- Arriving northbound in San Jose, the Coast Starlight misses the connection with the last Capitol Corridor train.

The Coast Starlight, however, has good scheduled connections with Caltrain at San Jose. The scheduled wait time to transfer to a San Francisco peninsula-bound Caltrain is 17 minutes from a southbound Coast Starlight train and 33 minutes from a northbound Coast Starlight train. Unfortunately, late operation of the Coast Starlight frequently makes these San Jose connections unreliable.

In addition to missing connections with regionally based rail services, the Coast Starlight also misses connections to other Amtrak long distance trains. Arriving in Los Angeles, the Coast Starlight misses the connection to the Southwest Chief (serving Fullerton, Riverside, San Bernardino, Barstow, Albuquerque, Kansas City, and Chicago). The Coast Starlight and California Zephyr (serving Sacramento, Reno, Salt Lake City, Denver, and Chicago) miss connecting with each other when going from Los Angeles and the Central Coast toward Reno or vice versa.

It is possible, however, to make a same-day connection in Sacramento when going from Seattle/Portland/Redding toward Reno and vice versa, although the passenger must wait five hours when heading southeast and seven and one-half hours when heading northwest to make the connection. Also, the Coast Starlight's schedule has it departing from and arriving in Redding and Chico in the hours between 1 AM and 4 AM both southbound and northbound. This late night/very early morning scheduling for the Northern Central Valley is due to the difficulty of serving all points between Los Angeles and Seattle at convenient times with only one daily train.

Considering the number of key California destinations served by the Coast Starlight, the coordination of its schedule with other train services, particularly regionally based rail systems, seems worthwhile. By providing the opportunity to transfer to rail lines reaching a broader range of destinations in the two largest metropolitan areas in the State, such coordination would make rail a more practical travel option for markets as yet underserved by rail. The Coast Rail Coordinating Council has proposed the addition of State-supported Coast Route service between San Francisco and Los Angeles, which would help to provide key connections with commuter rail services and the Capitol Corridor (e.g. making rail trips possible between the Central Coast and San Bernardino, Riverside, or Sacramento).

It is recommended that rail operators work to improve the coordination of schedules, particularly to facilitate transfers between trains with less frequent service (Amtrak long distance, Amtrak California, and commuter trains), as these transfers now tend to require the longest wait times. Such schedule coordination can be difficult, however, due to the need to schedule each train and type of service according to market demand from non-transferring passengers as well. The Department will take a leading role to ensure the maximum possible schedule coordination between the State-supported intercity rail routes, and between such routes and long distance and commuter rail services.

3.3 Fare Coordination

Fare coordination refers to the extent to which fare systems for passenger rail services are compatible with those of other rail services or connecting modes. Five criteria are used for this evaluation:

- The extent to which fares are currently coordinated.
- The extent to which the fare coordination is publicized.
- The availability of the connecting transit fare media on the connector rail premises.
- The ease with which passengers can understand and implement the fare transfer.
- The presence of a cost incentive for the connection.

The following are the main findings and conclusions:

The degree of rail-to-rail fare coordination provided is about equally low throughout California.

Currently, the Bay Area has some degree of fare coordination in one quarter of direct rail connections (i.e., rail-to-rail). A discounted transfer ticket is provided for users of about 13 percent of all available rail connections (including a discounted transfer between the Capitol Corridor and BART) and a free transfer is provided for about 6 percent of rail connections (specifically, going from Caltrain or ACE to VTA). The Los Angeles area has some degree of fare coordination for 30 percent of all available rail connections, with 20 percent of all available connections involving a discounted transfer and 10 percent (Metrolink to MTA Metro Rail) involving a free transfer. In San Diego County a free transfer is provided between Coaster and the San Diego Trolley. In the Sacramento area, 20 percent of all available rail connections have some degree of fare coordination. Specifically, the Amtrak Capitol Corridor service provides a free transfer to RT. It is worth noting that the Capitol Corridor also provides free transfers to several bus services, although this study is focused on rail-to-rail fare coordination.

Plans are underway for the Amtrak San Joaquin to provide such rail and bus transfers in the future as well.

Almost all connection pairs fail to fully satisfy the second criterion, providing passenger information. There is insufficient passenger information about fare coordination in California, which suggests that information concerning fare coordination generally only reaches regular system users. Regional transit and long haul passenger rail operators should take specific steps to ensure well publicized promotion of their transfer arrangements through pamphlets or posters readily available on-board and in stations. Another way of spreading information is via transit agency web sites, but this method only reaches those who have internet access. At greater expense, the use of promotional radio and TV spots on local stations and news channels can also be an effective method of increasing the public's awareness of the transfer capabilities of each transit operator. A combination of different approaches (web site, pamphlets, posters, other media) has the best chance of reaching a wide range of people, including new and prospective riders.

There is better fare coordination when going from the railroad mode (intercity or commuter rail) to urban rail transit, rather than vice versa. For example, the commuter rail operators in California (Metrolink, Coaster, ACE, and Caltrain) all score better in connecting to local transit than vice versa. The Amtrak Capitol Corridor and San Joaquin intercity rail services offer discounted BART passes, and the Capitol Corridor provides free Sacramento RT transfers on board the train, but no reciprocal discount exists. This difference may have to do with the fact that urban rail fares are lower (generally due to shorter trip distances) than commuter and intercity rail fares. Covering an appreciable portion or all of the connecting urban rail fare does not subtract much from the ticket revenue of the commuter or intercity rail agency.

Planned regional fare collection systems such as TransLink in the Bay Area and Universal Fare System in Los Angeles have the potential to significantly improve fare integration in the future by providing the following:

Single fare media. Use of a single stored value card allows seamless transfers from one mode to another without riders having to worry about different fare media and rules.

Convenience in purchasing and using. Cards can easily be loaded with cash value or specific agency pass products at add value machines available at the stations. Also, these cards may ultimately reduce boarding times due to faster processing, although this will need to be evaluated as the programs are implemented.

Lowest fare guarantee. The guarantee would allow the fare collection system to determine the lowest possible fare for a trip, given operator fare policies and individual user travel behavior. The technology exists to do this, but the specifics regarding how it would be applied are still being developed for both systems.

Intercity rail services could participate in these regional programs to increase statewide fare coordination and promote ridership on their systems.

For example, Amtrak could consider participating in TransLink and Universal Fare System, and establish mutually beneficial revenue sharing agreements with the connecting operators. The Department, Metrolink, and Amtrak are already working to improve fare coordination between the Metrolink and Amtrak Pacific Surfliner services. Metrolink monthly pass holders who use the Orange County or Ventura County Lines will be able to ride any Amtrak Pacific Surfliner train or Amtrak bus within the trip limits of their pass for no additional charge. Similarly, Amtrak's Pacific Surfliner passengers will be able to ride any Metrolink train within the limits of their ticket at no additional charge. In addition, both Metrolink and Amtrak will accept any of each other's fare media (e.g. one-way, round-trip, four-trip, ten-trip, or monthly passes) valid for travel between Los Angeles Union Station and the Burbank Airport station with no additional charge to the rider.

Furthermore, Southwest Airlines - the carrier with the most flights at Burbank Airport - is helping promote the program among its passengers by offering them the opportunity to ride between the Burbank Airport and downtown Los Angeles on either Amtrak or Metrolink for free during the first 90 days of the program. Southwest will also help publicize the program by including notices in their ticket jackets and providing information about the Amtrak/Metrolink connection on their internet site and through airport signage.

In the longer timeframe, Amtrak and Metrolink are working to develop a ticket vending machine for shared stations, which will enable passengers to make trips using both services at one coordinated fare. The engineering of the vending machines is underway, with installation anticipated within the next year or two.

3.4 Connectivity Information Dissemination

Connectivity information dissemination refers to the level of connectivity information that needs to be provided to users to connect between rail systems, or between a rail system and another mode of transportation. Key findings and recommendations include the following.

Regional transit information websites are currently the most comprehensive sources for connection information.

Regional transit websites offer the advantage of providing information and links for all transit services within a given region. Users only need to find or have the address of one transit provider in order to locate nearly all needed information on transit connectivity within the region. An excellent example is transitinfo.org supported by the MTC, the regional transportation planning agency for the nine counties of the Bay Area. Transitinfo.org contains complete information for all Bay Area passenger rail services (Amtrak, commuter rail, heavy rail, and light rail), as well as connecting bus systems. The website also contains maps, schedules, and links to individual rail operator websites, and a “Taking Transit” trip planner link that provides customized transit trip itineraries based on information given by website users. The trip planner shows detailed connection information, including station locations, schedules, and headways. Currently, 15 different transit services are covered in the trip planner, but plans are underway to include all Bay Area transit operators by the end of 2002.

Other notable websites are the Southern California, Central California, and Northern California Transit Information Pages, which are located at socaltip.tipnetworks.org, cencaltip.tipnetworks.org, and norcaltip.tipnetworks.org, respectively. Created by volunteers, they are similar in scope to transitinfo.org.

Specific to the San Diego Area, the website www.sdcommute.com provides links to comprehensive carpool and transit information within San Diego's Metropolitan Transit System (MTS). The MTS includes the San Diego Trolley, Coaster commuter rail line, and the San Diego Transit Corporation and North County Transit District bus networks. In addition to these sites, the website www.catransit.com offers links to virtually all local, regional, and intercity rail and bus operators and related agencies throughout California. All regions should work to develop comprehensive transit information websites similar to those described above. The Department will assist in this effort by adding links to all regional transit information and individual passenger rail operator websites to its Amtrak California.com website.

The websites of individual passenger rail operators are generally the next best source for rail and transit connection information.

All operator websites researched have some link to other passenger rail and transit agencies or a regional site with transit connection information. The websites vary, however, in the way the information is presented and how easily it can be found from the home page. On many transit agency websites, the home page does not indicate where to click in order to reach information on transit connections. Such information can be several webpage layers from the homepage and therefore difficult to find.

Rail operator telephone services generally offer connecting rail and transit information, provided the caller requests a specific starting point and destination.

In most cases, customer service agents do not have access to complete lists of connecting rail and transit agencies, limiting their ability to assist the public. In addition, the telephone services generally do not support trips that require more than two transfers. Providing clear connection information to customer service agents would greatly assist this method of dissemination. This is important given that not everyone has access to the internet.

The quality and user friendliness of other information sources vary widely.

Some agencies list connecting rail and other transit services with phone numbers in printed pamphlets, but do not provide maps showing connection points. Others provide a map that depicts transfer stations, but do not provide any other information on connecting services, such as schedules. For instance, Muni maps provide Caltrain and BART connecting stations, which are highlighted. Information provided within stations also varies widely. Some agencies have begun to address this problem by developing real-time passenger information displays within stations. Such systems typically display current information on the status and projected arrival time of the next train, but they could potentially be utilized to display information on train connections available at different stations as well. BART already has real-time information displays within stations, and BART and Muni provide real-time audio announcements for the visually impaired. The Department and Amtrak are working with the

Capitol Corridor Joint Powers Authority and Metrolink to develop real-time information displays at selected stations on the Capitol Corridor and Pacific Surfliner routes, respectively. Real-time information systems have the potential to provide a particularly needed service at rural and unstaffed stations, where the lack of a station agent means that passengers have no other source of current information.

Generally, operators should work to make the information sources identified above more useful to connecting passengers. The Department will provide links from its statewide rail website to regional and rail operator websites, and will continue to work with commuter rail operators to provide enhanced real-time information of stations where passengers can connect between Amtrak intercity and commuter rail services.

4. TRACK CONGESTION

This section of the assessment presents a discussion of track congestion relief needs for the State over the next ten years. Train densities are first identified as an indication of existing track congestion levels. Total needs, as identified by public passenger rail operators and public agencies that own freight rail facilities (e.g. ports), are then summarized, followed by needs for the immediate timeframe (one to three years) and the near term timeframe (four to ten years). The detailed analysis and documentation that form the basis for this section are contained in Appendix G, which is available upon request from the Department's Division of Rail.

4.1 Train Densities

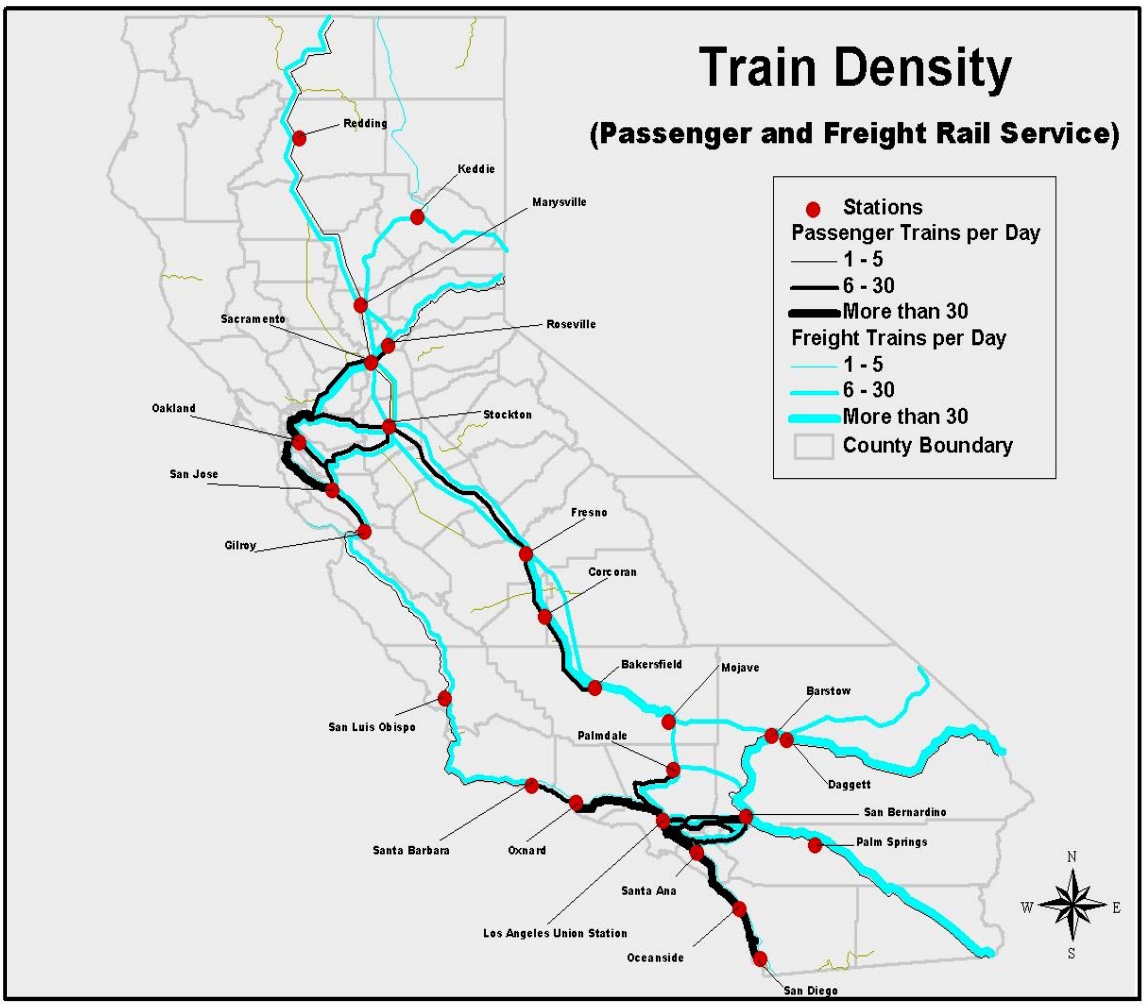
Passenger rail system operators provide revenue service ranging from ten hours per day (e.g. ACE) to 19-20 hours per day (e.g. Capitol Corridor and Caltrain). If weekend service is offered, this service may differ in terms of hours or frequencies. Freight operators can operate 24 hours per day.

Exhibit 6 illustrates daily weekday train traffic for both passenger and freight services in California. This exhibit does not include urban rail systems due to the high frequencies of service.

The thickness of the lines represents the volume of trains for both passenger and freight systems. The Greater Los Angeles Area (including Los Angeles, Orange, San Bernardino and Riverside counties), the San Joaquin Valley, the San Diego Area, the Bay Area, the area between the San Francisco Bay and Sacramento, Sacramento north to the Oregon border, and northeast of Sacramento to Keddie, all display volumes greater than 30 trains per day for either passenger and/or freight traffic.

The greater the volume of traffic, the higher the chance that track congestion is a problem and that capital plans will be developed to alleviate this track congestion. The ranking of areas by traffic volume generally follows the ranking of areas by projects based on value.

Exhibit 6 – Train Densities



4.2 Total Needs

To ascertain the State's current areas of rail congestion and proposed mitigation efforts, this assessment draws from various sources, which include:

- Recent studies, reports and funding programs, including Amtrak's California Passenger Rail System 20-Year Improvement Plan, the Inventory of Ten-Year Funding Needs For California's Transportation Systems (Pursuant to Senate Resolution 8), and other studies conducted or sponsored by the California Department of Transportation, local transportation agencies, Metrolink, Caltrain, Regional Transportation Planning Agencies, and Metropolitan Planning Organizations; RTIPs and the ITIP that comprise the State Transportation

Improvement Program (STIP); the State's TCRP; Capital Improvement Programs (CIPs); RTPs; and strategic plans and other planning documents.[1]

- Responses to surveys mailed to the Class I railroads, short line and terminal railroads, and ports
- Information gathered at stakeholder meetings and in face-to-face discussions.

Over the ten-year timeframe, 126 individual projects account for over $4.7 billion of track congestion relief project needs. The bulk of this amount (83 percent) is identified for new track projects, with the balance for speed improvements and other capacity projects.

Table 7 shows the total number of track congestion relief projects identified by public passenger rail operators and public agencies that own freight rail facilities, and breaks this information further into type of project.

Table 7 – Total Track Congestion Relief Projects By Type ($ in millions)

Type of Project	#	$	%
New Track	108	$3,922	83%
Speed Improvements	11	$443	9%
Other Capacity Improvements	7	$366	8%
TOTAL	**126**	**$4,731**	**100%**

Table 8 presents information on the total projects by area. The needs include all track congestion projects identified by the operators and other sources above. For the purposes of this assessment, the study considered that the project totals identified reflect local needs and priorities. Actual costs may differ from the amounts stated in agency plans. The needs figures do not necessarily reflect any programming of funds or potential for return-on-investment.

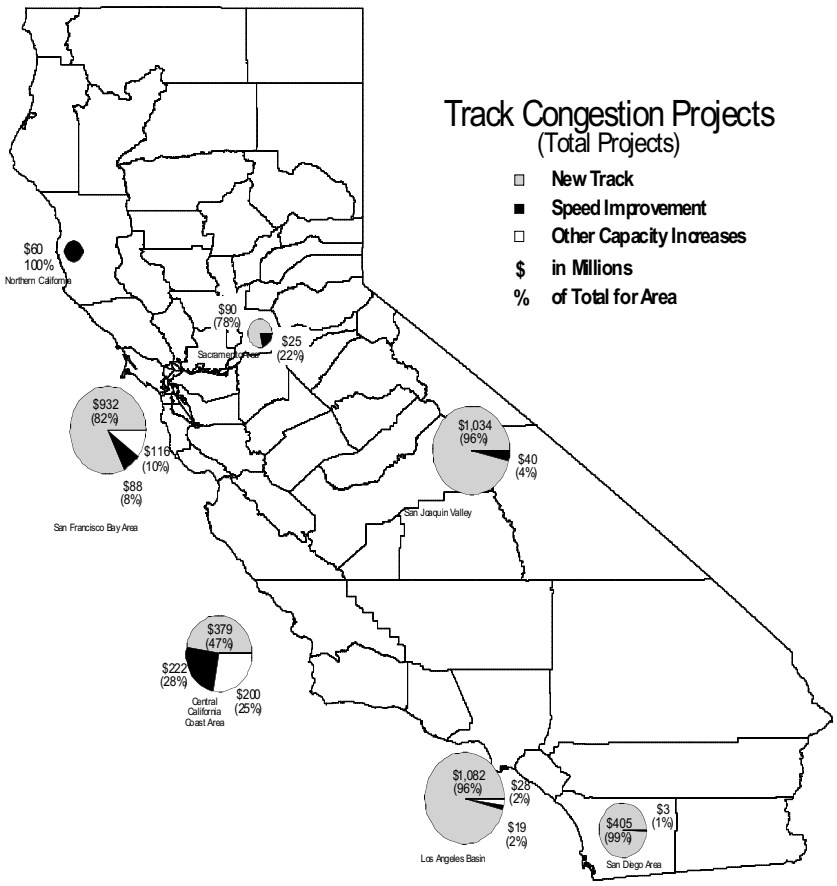
Table 8 – Total Track Congestion Relief Projects By Area ($ in millions)

	Total Projects		Type of Project		
Areas	#	$	New Track	Speed Imps	Other Capacity Imps
San Francisco Bay Area	25	$1,136	$932	$88	$116
Greater Los Angeles Area	49	$1,129	$1,082	$19	$28
San Joaquin Valley	16	$1,074	$1,034	$40	0
Central California Coast	13	$801	$379	$222	$200
San Diego Area	15	$408	$405	$3	0
Sacramento Area	7	$115	$90	$25	0
Northern California	1	$68	0	$60	0
TOTAL	**126**	**$4,731**	**$3,922**	**$ 457**	**$ 344**

[1] *Bay Area Rapid Transit District Strategic Plan and New Era of Partnership 1999 and District Short Range Transit Plan and Capital Improvement Program FY02 Update FY 2002-2011, Los Angeles County Metropolitan Transportation Authority 2001 Long Range Transportation Plan for Los Angles County, North County Transportation District Ten-Year Strategic Business Plan 2001-2011, Orange County Transportation Authority – A Long Range Transportation Plan FY 1998-2020, Sacramento Regional Transit District Ten-Year Expansion Strategy and other information from Sacramento Regional Transit, San Diego Metropolitan Transit Development Board Short Range Transit Plan FY 2002–2006, San Francisco Municipal Railway Short Range Transit Plan 2002-2021, Santa Clara Valley Transportation Authority Short Range Transit Plan FY2002-2011 and Valley Transportation Plan 2020, Peninsula Joint Powers Board (Caltrain) Capital Improvement Plan 2002-2012, Southern California Regional Rail Authority (Metrolink) Budgetary Information and other information.*

The Greater Los Angeles Area and the Bay Area are the most highly congested areas in the State with 24 percent of the total identified project needs ($1.1 billion each). The third most congested region is the San Joaquin Valley (Bakersfield – Fresno – Stockton), with $1.0 billion worth of projects. The region with the fourth highest level of identified project needs is the Central California Coast Area – the area between Gilroy and Santa Barbara – with $801 million of project needs. Although this corridor currently has less than 30 trains per day (see Exhibit 6), various track and signal projects have been identified in order to add capacity for future Coast Route passenger service between Los Angeles and San Francisco.

Exhibit 7 – Total Track Congestion Relief Projects



In addition to identifying track congestion needs, this assessment also identifies the root causes for this congestion. Root causes include: slow curves; increased traffic on single track; conflicts between freight and passenger trains; an increased mix of passenger services (e.g. Amtrak California, Amtrak long-distance and commuter trains); rail traffic not distributed evenly during the day; limited ability to cross over to other track; slower speeds through grade crossings; inability for two trains to meet at a station, requiring delays to one train; and multiple speed restrictions.

However, the predominant reasons for the congestion are increasing traffic on single track and/or operating conflicts between freight and passenger service (i.e. not enough track capacity for the movement of both passenger and freight services). As a result, at various locations throughout the State, the rail system is running out of capacity and existing freight demand is causing delays to passenger rail services. In the future, growth in freight and passenger services will require expanded rail infrastructure.

A survey of the freight railroads conducted as part of this assessment noted the increase in delays to rail shipments in urban areas was directly related to shared use of main lines by commuter and intercity passenger operations which do not have sufficient capacity to operate efficiently. The survey identifies the following areas where there are high levels of freight and passenger rail congestion; parallel highways are noted.

BNSF

Los Angeles to Fullerton (I-5)

Fullerton to San Bernardino (SR-91)

Modesto to Stockton (SR-99)

UP

Los Angeles to Colton (I-10)

Los Angeles to Riverside (SR-60)

Gilroy to Santa Clara (SR-101)

Santa Clara to Newark (I-880)

Appendix G provides further detail.

In many areas of the State, passenger rail services share railroad rights-of-way with freight railroads. In some cases, passenger trains operate on tracks belonging to and used by freight railroads and freight trains operated on tracks controlled and used by passenger trains. For both passenger and freight railroads, the primary issue is the capacity of the route to accommodate all train movements.

Frequently, rail capacity is insufficient to handle the existing service levels of both freight and passenger service. This is especially problematic in metropolitan areas because of the substantial freight and passenger traffic traveling along the same rail lines. For example, according to Metrolink statistics from July 2001 to July 2002, train delays of their passenger trains caused by freight train traffic was from 24 percent to 65 percent with an overall annual average of 35 percent of the passenger trains being delayed.

Amtrak's July 2002 year-to-date statistics show an overall on-time performance rate of 77.8 percent for the four west coast services, the Pacific Surfliner, the Capitols, the San Joaquins, and the Cascades (Eugene, Oregon to Vancouver, British Columbia) that it operates. In other words, 22.2 percent of these trains are late. Increases in overall service by all passenger rail carriers demonstrate that passenger and freight congestion incidents will increase unless funding is provided to correct rail congestion.

4.3 Immediate Needs (One to Three Years)

Of the $4.7 billion of track congestion relief projects identified for all of California, almost one-half of the dollar value ($2.2 billion) is associated with immediate-term projects (timeframe of one to three years). Table 9 shows the total number of immediate-term track congestion relief projects and breaks this information further into type of project and time period. New track projects constitute the overwhelming need for the immediate term.

Table 9 – Immediate Projects By Type ($ in millions)

Type of Project	#	$	%
New Track	66	$1,974	90%
Speed Improvements	5	$72	3%
Other Capacity Improvements	2	$152	7%
TOTAL	**73**	**$2,198**	**100%**

The Bay Area, the Greater Los Angeles Area, and the San Joaquin Valley (Bakersfield - Fresno – Stockton) have the highest shares of track congestion relief needs in the immediate term (28, 26, and 23 percent of total project value, respectively). This fact is illustrated in Table 10 below.

Table 10 – Immediate Projects By Area ($ in millions)

Areas	#	$	%
San Francisco Bay Area	12	$613	28%
Greater Los Angeles Area	28	$578	26%
San Joaquin Valley	12	$489	23%
San Diego Area	12	$265	12%
Central California Coast	6	$185	8%
Sacramento Area	3	$68	3%
Northern California	0	$0	0%
TOTAL	**73**	**$2,198**	**100%**

4.4 Near Term Needs (Four to Ten Years)

Of the $4.7 billion of total track congestion relief needs, roughly $2.5 billion in projects have been identified for the near term (four to ten years from now). In the near term, the need for new track projects continues to predominate. However, speed improvement projects make up a significantly higher proportion of the dollar value of project needs in the near term compared to the immediate term. Much of this difference is the result of speed improvement projects identified to make Coast Route passenger service (Los Angeles - San Francisco) a more practical travel option. Table 11 identifies the total number of near-term track congestion relief projects and breaks this information further into type of project and time period.

Table 11 – Near Term Projects By Type ($ in millions)

Type of Project	#	$	%
New Track	42	$1,948	77%
Speed Improvements	6	$371	15%
Other Capacity Improvements	5	$214	8%
TOTAL	**53**	**$2,533**	**100%**

Geographically, the Central California Coast Area has the highest level of identified needs with 24 percent of the project value, followed by the San Joaquin Valley (Bakersfield – Fresno – Stockton) with 23 percent, the Greater Los Angeles Area with 22 percent, and the Bay Area with 21 percent. The significant increase in Central California Coast projects in the near term compared to the immediate term is the result of the need for new track and, as described above, speed improvements to accommodate additional Coast Route passenger service. The statistics for the near-term period are presented in Table 12 below.

Table 12 – Near Term Projects By Area ($ in millions)

Areas	#	$	%
Central California Coast	7	$616	24%
San Joaquin Valley	4	$585	23%
Greater Los Angeles Area	21	$551	22%
San Francisco Bay Area	13	$523	21%
San Diego Area	3	$143	6%
Northern California	1	$68	2%
Sacramento Area	4	$47	2%
TOTAL	**53**	**$2,533**	**100%**

4.5 Needs – Freight Systems

As directed by the Governor's signing message on AB 2866, this assessment does not specifically address private freight carrier needs, unless there are associated public benefits. If publicly owned freight agencies (including short line railroads and ports) identified projects to relieve track congestion, these projects were included in the total.

Several areas have also been identified by the Class I railroads as chokepoints, although no projects identified by the Class Is were included in the dollar totals for needs. Relieving these chokepoints may result in spillover benefits to passenger service.

The assessment found that physical connectivity for the private short line and terminal railroads is generally sufficient for the movement of freight. However, interchanges with the Class I railroads are not always efficiently handled and can at times be points of congestion. No private short line or terminal railroad projects were included in the dollar totals for needs.

4.6 Funding of Track Congestion Projects

Approximately $4.7 billion worth of rail projects have been identified to relieve track congestion in California over the next ten years. Over three-quarters of these projects (77 percent) are as of yet unfunded.

The Northern California and Sacramento regions have the highest proportion of needs for which funding sources have been identified (100 and 45 percent, respectively), although the needs identified for Northern California have been met through the funding of just one $68 million project (repairing and upgrading the Northwest Pacific Railroad (NWP) to Class II standards). The Central California Coast Area, San Diego Area, and San Joaquin Valley have a high proportion of identified track congestion projects that are as yet unfunded (99, 96, and 92 percent, respectively). Table 13 below identifies the total number and dollar value of the projects by region and funding status.

Table 13 – Funded/Unfunded Project Totals By Area ($ in millions)

	Total		Funded			Unfunded		
Areas	**#**	**$**	**#**	**$**	**%**	**#**	**$**	**%**
San Francisco Bay Area	25	$1,136	12	$489	43%	13	$647	57%
Greater Los Angeles Area	49	$1,129	26	$347	31%	23	$782	69%
San Joaquin Valley	16	$1,074	3	$90	8%	13	$984	92%
Central California Coast	13	$801	1	$5	1%	12	$796	99%
San Diego Area	15	$408	2	$16	4%	13	$392	96%
Sacramento Area	7	$115	3	$52	45%	4	$63	55%
Northern California	1	$68	1	$68	100%	0	$0	0%
TOTAL	**126**	**$4,731**	**48**	**$1,067**	**23%**	**78**	**$3,664**	**77%**

The following are recommendations and findings regarding track congestion:

- At various locations throughout the State, the rail system is running out of capacity and existing freight demand is causing delays to passenger rail services. Expected growth in freight and passenger services will require expanded rail infrastructure in the future.
- To relieve all currently identified track congestion needs in California, $3.7 billion needs to be provided and spent over the next ten years to cover the cost of unfunded track congestion projects.
- Subject to the availability of funding, it is recommended that the State, in cooperation with the federal, local, and regional governments, and with rail operators, work to address the track congestion issues identified. These entities should work together to ensure that anticipated service levels are viewed in the aggregate and that all cumulative track congestion problems have therefore been identified.

5. CAPITAL IMPROVEMENT PLANS

This section begins with a brief review of current funding sources for rail capital projects, followed by a review of capital improvement plans. The detailed analysis that forms the basis for this section, as well as the list of source documents used, are contained in Appendix H, which is available upon request from the Department's Division of Rail.

5.1 Current Funding Sources

A number of funding sources are available for rail capital projects, but these funds fall short of the overall need. This is further detailed below.

State money is only one source of rail funding in California, representing only one-third of overall rail funding, with STIP-RIP and the TCRP being the most important State sources. State funds are supplemented by a number of dedicated and discretionary federal and local sources.

Federal funds come primarily from the Federal Transit Administration for urban and commuter rail systems. Intercity rail (e.g. Amtrak Capitol Corridor, Pacific Surfliner, and San Joaquin) projects, however, are generally not eligible for federal capital funds. However, station projects sponsored by cities and counties, and track and signal projects sponsored by commuter rail agencies that benefit both commuter and intercity rail services, are eligible for federal funding. Rail advocates have introduced legislation in Congress to provide a source of federal funding for intercity rail capital projects.

Local sources continue to grow with the recent passage of several transportation measures in self-help counties. However, the relatively new requirement that dedicated transportation sales tax measures must receive a two-thirds majority vote for passage or renewal makes future approvals of such taxes more challenging.

Another issue is the number of dedicated funding purposes that limit discretion in programming capital projects.

5.2 Capital Plan Review

Rail capital projects for the ten-year period, either noted in public transportation agency documents or reported by such agencies and publicly owned freight railroads or their operators, total $16.2 billion. This amount includes both funded ($9.8 billion) and unfunded ($6.4 billion) needs. Actual costs for capital improvement plans may differ from the amount stated in agency plans.

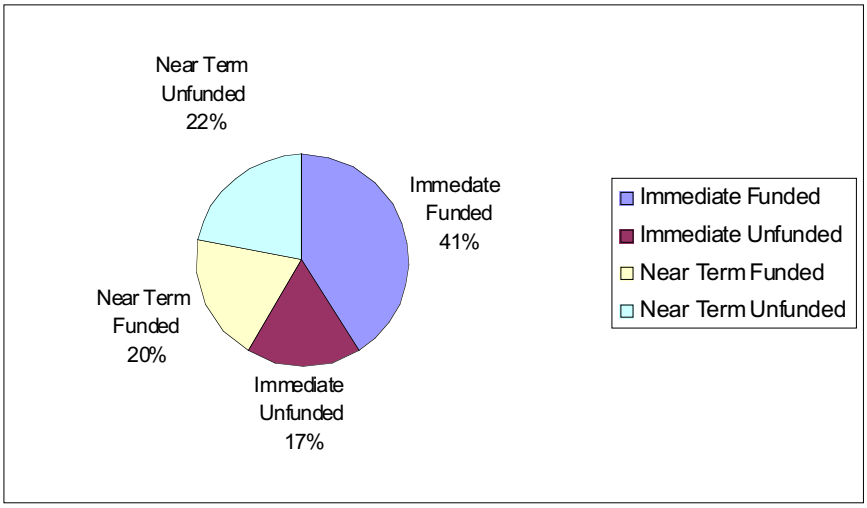
The agency breakdown by project type, total cost, and funding status is shown on the following page in Table 14.

Table 14 – 10-Year Rail Capital Plans by Agency

	Public Safety ($Millions)	Capacity ($Millions)	Service ($Millions)	Total Cost ($Millions)	Funded (%)	Unfunded (%)
State Intercity Program	**133.7**	**3,553.0**	**314.6**	**4,001.3**	**14.9%**	**85.1%**
- Capitol Corridor	15.4	345.3	97.2	457.9	36.2%	63.8%
- San Joaquin	72.6	818.4	47.2	938.2	19.0%	81.0%
- Surfliner	29.7	1,624.0	75.1	1,728.8	19.0%	81.0%
- Coast	14.9	500.4	34.8	550.1	0.0%	100.0%
- Other	1.1	264.9	60.3	326.3	0.0%	100.0%
Bay Area Rapid Transit	541.6	230.7	1,492.2	2,264.5	99.8%	0.2%
Caltrain	84.6	1,574.7	158.0	1,817.3	22.3%	77.7%
ACE/Altamont Commuter		1.0	80.0	81.0	46.9%	53.1%
San Francisco MUNI		1,549.3	162.9	1,712.2	84.2%	15.8%
Santa Clara VTA		629.2	271.4	900.6	99.0%	1.0%
Sonoma Marin Area Rail Transit			162.2	162.2	62.0%	38.0%
Hollister Commuter Service			19.6	19.6	5.1%	94.9%
Sacramento RT	8.7	206.7	280.3	495.7	100.0%	0.0%
Auburn-Davis Commuter			70.0	70.0	0.0%	100.0%
Sacramento Yolo Port			1.5	1.5	0.0%	100.0%
Gilroy-Salinas Commuter			25.7	25.7	89.5%	10.5%
Santa Cruz County			20.0	20.0	85.0%	15.0%
State Line Light Rail (Tahoe)			32.0	32.0	0.0%	100.0%
Lake County Railroad			5.3	5.3	5.7%	94.3%
Northwestern Pacific RR			60.0	60.0	100.0%	0.0%
ACE Modesto Service			50.5	50.5	0.0%	100.0%
Fresno Rail Consolidation		400.0		400.0	0.0%	100.0%
SCRRA/Metrolink	4.3	369.7	319.9	693.9	50.8%	49.2%
Los Angeles MTA			1,135.1	1,135.1	100.0%	0.0%
Orange County Centerline LRT			1,245.6	1,245.6	100.0%	0.0%
Ports of LA/Long Beach		98.0		98.0	10.0%	90.0%
Pacific Harbor Line			1.0	1.0	0.0%	100.0%
North Co. Transit District (Coaster/Escondido)			308.1	308.1	100.0%	0.0%
San Diego Trolley			548.6	548.6	76.2%	23.8%
Totals - All Agencies	**772.9**	**8,612.3**	**6,764.5**	**16,149.7**	**60.7%**	**39.3%**
Total Intercity Service	133.7	3,553.0	314.6	4,001.3	14.9%	85.1%
Total Commuter Service	88.9	1,945.4	1,194.0	3,228.3	38.0%	62.0%
Total Urban/Light Rail Service	550.3	2,615.9	5,188.1	8,354.3	94.6%	5.4%
Total Public Freight Service		98.0	67.8	165.8	42.4%	57.6%
Total Special Purpose		400.0		400.0	0.0%	100.0%

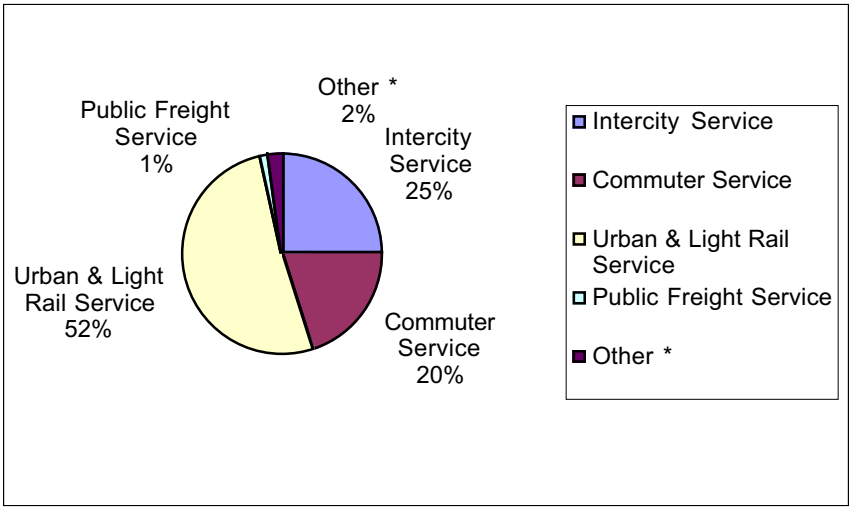
The projects are further classified here as immediate-term projects (occurring between FYs 2002 and 2005) and near-term (FYs 2006-11). Exhibit 8 shows immediate-term projects with unfunded needs totaling $2.8 billion and representing 17 percent of all capital projects occurring during the period.

Exhibit 8 - Share of All Capital Projects by Funding and Time Frame (FY 2002 through 2011)



Urban and light rail projects totaling $8.4 billion, and representing 52 percent of all project needs identified are shown in Exhibit 9. This category includes several new light rail lines and extensions of existing lines, as well as significant seismic safety upgrades to BART (i.e. the Transbay Tube) in the Bay Area.

Exhibit 9 - Capital Projects Identified by Sponsor (FY 2002 through 2011)



• This consists of the proposed Fresno Rail Consolidation project, which would move BNSF train operations to the UP line through Fresno.

Project Classifications and Conflicts

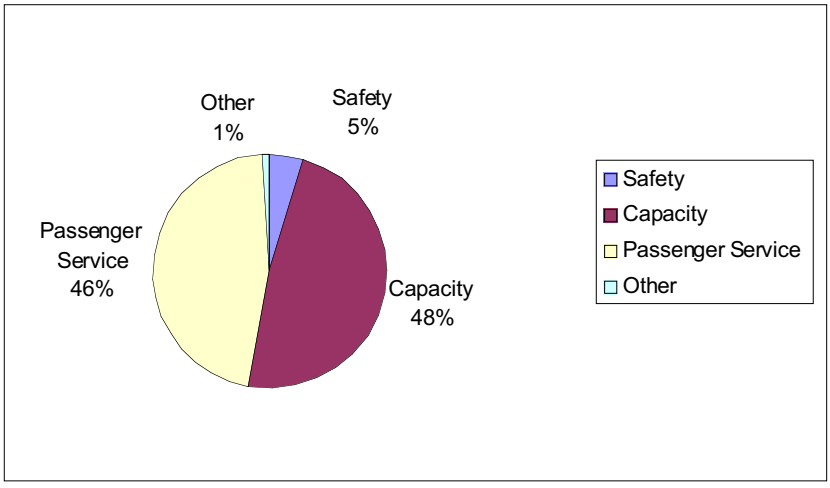
The agency breakdown by project type is shown in Table 14. The capital plans of the passenger rail and publicly owned freight rail systems were categorized as follows, in accordance with the provisions of AB 2866.

- Public Safety – including, but not limited to, grade crossing improvements and separations.
- Track Capacity – including new track, sidings, signal improvements, track structure improvements (e.g. bridges and tunnels), and maintenance and layover facility projects.
- Passenger Service – a broad category including, among other things, additional passenger cars and locomotives, new stations, station improvements, rail extensions and new services, and rehabilitation and maintenance of facilities.

Some projects that clearly could not be categorized as any of the above were summed into a fourth category of multi-purpose or other projects. These were principally planning studies and projects benefiting publicly owned freight railroads.

The distinction between track capacity and passenger service projects is somewhat blurred because the capacity projects are all designed to permit more effective or expanded passenger services. Taken together, track capacity and passenger service projects account for nearly all capital plans (Exhibit 10).

Exhibit 10 - Capital Plans by Project Type
(FY 2002 through 2011)



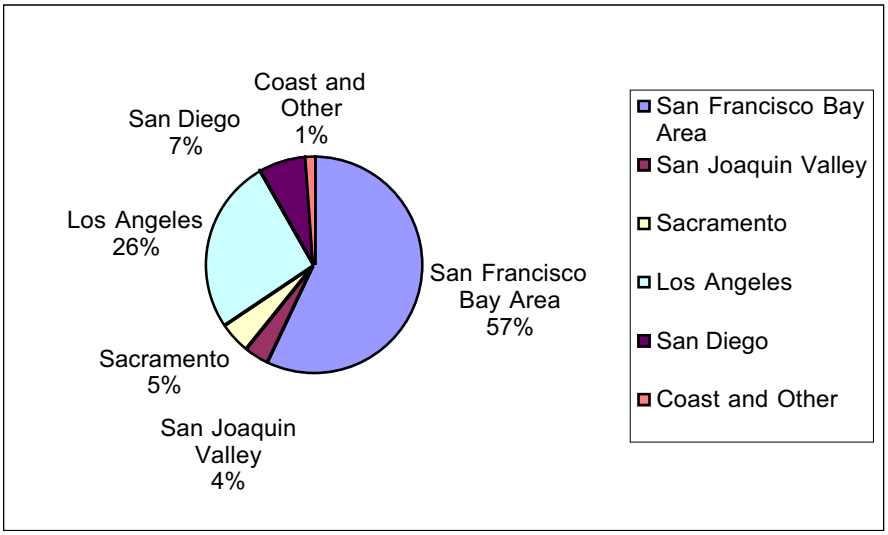
AB 2866 required identification of conflicts between capital plans of passenger rail entities. The study identified two types of potential conflicts. The first would be physical conflicts between projects proposed by different agencies over the same track or in the same area. No evidence of this type of conflict was discovered. Agency projects are reviewed by Metropolitan Planning Organizations (MPOs) and incorporated into MPO planning documents, so finding any such conflicts between proposed projects would be unlikely.

The second type of apparent conflict involves differences in funding assumptions or project timing. Some projects serve users of multiple rail systems, and are joint efforts of more than one agency. The individual agency documents usually list only that agency's share of the total project cost, so that the same project described in different plans may appear to have different funding requirements or phasing. For this reason, the project list of the agency that would actually operate the service was used as the primary source. The project review found no conflicts with respect to any given project.

Projects by Region and Service Corridor

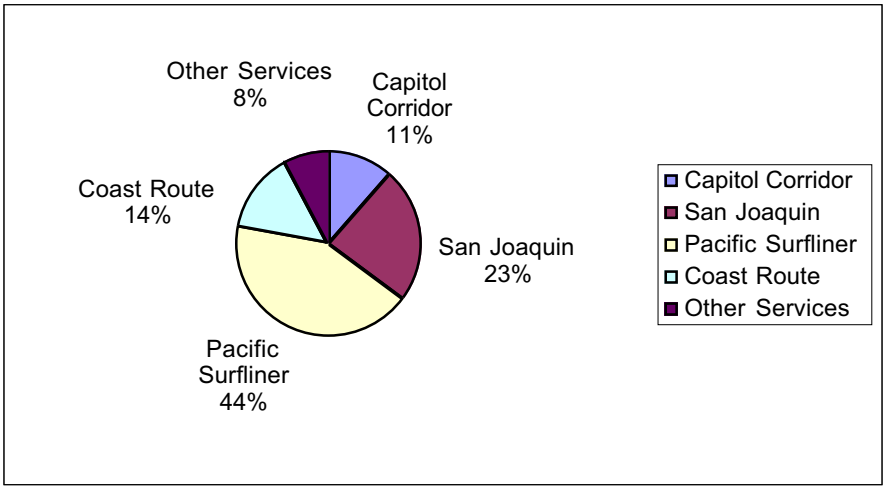
The capital projects summed by geographic region in Exhibit 11 total $12.1 billion. This figure excludes projects supporting State-sponsored intercity rail services. Those services were analyzed separately as they extend across typical regional boundaries.

Exhibit 11 - Capital Projects by Geographic Area (FY 2002 through 2011)



The intercity rail capital projects summed by service corridor in Exhibit 12 total $4.0 billion. Projects are broken down by the three existing State-supported intercity rail services (Pacific Surfliner, San Joaquin, and Capitol Corridor), as well as proposed services (the Coast Route between downtown San Francisco and downtown Los Angeles, San Francisco-Monterey Peninsula service, Oakland-Reno service, Sacramento-Redding service, and Los Angeles-Palm Springs/Coachella Valley service). Of these services, the Pacific Surfliner and the San Joaquin have the dominant share of the project total in dollar value, $1.7 billion and $0.9 billion, respectively. Projects accounting for much of this share are double tracking along the San Joaquin Route and double and triple tracking, run-through tracks at Los Angeles Union Station along the Pacific Surfliner Route, and new cars and locomotives for additional frequencies on existing corridors and for new corridors.

Exhibit 12 - Intercity Rail Projects by Service Corridor (FY 2002 through 2011)



6. UNFUNDED OPERATING NEEDS

Short Range Transportation Plans and other documents were reviewed to determine unfunded operating needs for all rail operators statewide. The detailed analysis that forms the basis for this section, as well as the list of source documents used are contained in Appendix I, which is available upon request from the Department's Division of Rail.

All but three agencies reported no unfunded operating needs anticipated during the study period (between 2002 and 2011) for existing services. The three agencies that identified unfunded operating needs were BART, Muni, and Metrolink as shown in Table 15.

Table 15 – Unfunded Operating Needs

Operator	Operating Deficit
BART	$80 million
Muni	$86 million *
Metrolink	$33 million
Total	**$199 million**

* Estimated rail portion of total transit deficit.

Although Amtrak has not identified unfunded operating needs, it has requested $1.2 billion in federal operating and capital support for Federal Fiscal Year 2002-03. The Bush Administration has stated that any appropriation over $521 million, which is the annual amount of federal funding that Amtrak has received in recent fiscal years, be justified by reforms and restructuring. Congress and the Administration's ultimate decision on the $1.2 billion funding request will determine whether Amtrak can continue to operate all existing services.

In the transit field, agencies with operating deficits attempt to find the needed operating funds from various sources, including fare increases, cost containment, or new funding sources. If sufficient funds cannot be found, services are reduced to match available funds. This is the only feasible solution for unfunded operations, since these agencies must have balanced budgets.

In addition to the above-described deficits for existing services, various proposed new services have unfunded operating needs. These include: Sonoma-Marin Area Rail Transit (SMART) commuter rail service, the ACE commuter rail extension to Modesto, the Caltrain commuter rail extensions from Gilroy to Hollister and from Gilroy to Salinas, Auburn-Sacramento-Davis-Dixon commuter rail service, Stateline light rail transit (proposed route between South Lake Tahoe, California, and Stateline, Nevada), Riverside to Perris commuter rail, and light rail transit in Orange County (CenterLine project). The North Coast Rail Authority has estimated operating funding needs for the NWP freight service at about $20 million for the first four years following opening of the entire railroad. Of this amount, $13 million in Proposition 116 funds have been proposed for track maintenance. The amount of operating funding that will be required for most of the rest of the proposed new services is unknown at this time.

Although most agencies with existing rail services did not identify unfunded operating needs, this does not necessarily mean that operating funding levels, and therefore service levels, are optimal relative to passenger demand. If more operating funding were available, rail operators would likely provide more service.

7. COST EFFECTIVENESS OF RAIL INVESTMENTS

This section describes the cost effectiveness and public benefits of California rail capital investments. Cost effectiveness includes both a benefit-cost analysis of current rail funding as well as an evaluation of rail service efficiency and effectiveness (e.g. farebox recovery).

7.1 Benefit-Cost

The analysis is based upon a benefit-cost evaluation of rail projects included in the TCRP as well as recent ITIP cycles (2000 and 2002) of the STIP. The analysis also draws on information submitted by urban rail operators for projects included in other funding programs, such as the STIP's RTIP. These projects generally rely on federal and local funding sources. The projects analyzed represent a mixture of programmed and proposed rail expenditures. The detailed analysis and documentation that form the basis for this section are contained in Appendix J, which is available upon request from the Department's Division of Rail.

The projects were analyzed using the Cal-B/C, the Department's tool for evaluating the cost effectiveness of projects proposed for the ITIP. The model was developed to provide a common framework for evaluating several highway and rail infrastructure projects over a short period of time. A benefit-cost ratio of 1.0 is the break-even point between costs and benefits, so projects with a ratio above 1.0 are considered to be cost effective and those with a ratio below 1.0 are considered not to be cost effective. Cal-B/C estimates the dollar value of benefits associated with four types of user impacts:

- Travel time savings.
- Private vehicle operating cost savings.
- Safety benefits.
- Emission reductions.

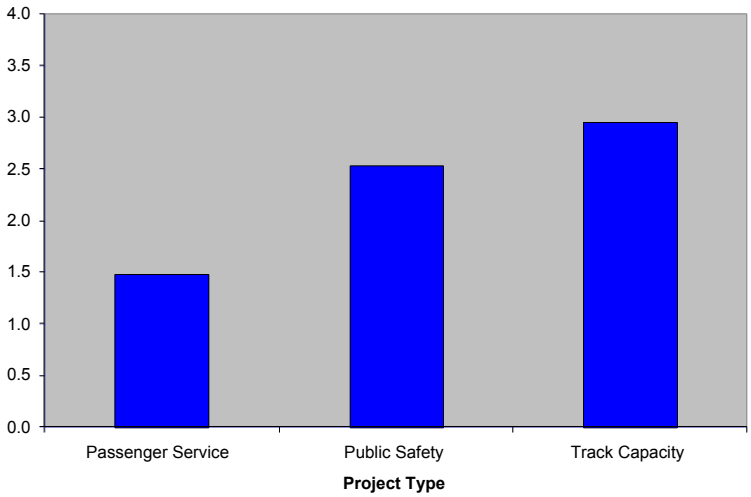
Some benefits are difficult to quantify and are not included in this review. For example, relocating a rail station or providing a pedestrian overpass may offer great convenience for rail passengers and other non-rail users. The benefit-cost analysis also excludes consideration of the benefits to freight railroads. For example, a double track project that improves travel times for rail passengers may also benefit goods movement by expediting freight trains or increasing rail capacity. In this sense, the benefit-cost analysis is a conservative estimate of the public benefits of rail investments.

As a whole, California rail investments are cost effective. Rail projects are about equal in cost effectiveness to highway projects (with an average benefit-cost ratio of 2.3 versus 2.4, respectively), but they also generate a number of public benefits that are difficult to quantify. As with highway investments, approximately half of the most recent rail projects are expected to produce quantifiable user benefits that outweigh the project costs. However, cost effectiveness is only one of several considerations in making transportation investments. Other considerations include equity, economic benefits, impacts on natural resources and environmental sustainability, and customer satisfaction outside of travel time. While these benefits may be quantifiable to some

degree, they were not included in the cost effectiveness analysis due to the difficulty of quantifying them and the potentially questionable outcome of such an attempt.

As shown in Exhibit 13, track capacity projects are the most cost effective from a benefit-cost standpoint, but it should be noted that the sample of public safety projects used in the analysis was fairly small (see the description of project classifications in Section 5.2). Also, the track capacity projects included in the analysis are largely low-cost projects in rural areas, and not high-cost urban area projects requiring tunneling or new structures. The State's greater emphasis on track capacity investments is supported by the benefit-cost ratios (nearly 56 percent of track capacity projects receive State funding, while only 46 percent of passenger projects do). However, the benefit calculations exclude a number of public benefits, such as passenger convenience, that are more likely to result from passenger service improvements. As a result, benefit-cost ratios for passenger service improvements are likely to understate the true value of these projects to the public. Some enabling investments, such as the construction of new stations or the rehabilitation and maintenance of existing track and facilities, do not generate specific user benefits that the Cal-B/C model addresses. However, such improvements are essential to improve customer service and satisfaction, and result in higher ridership and revenues. Other project benefits not addressed by the model can include improved pedestrian access, such as to beaches on the coast, and wetlands restoration.

Exhibit 13 - Benefit-Cost Ratios by Project Type



Source: Caltrans 2000 and 2002 STIP, TCRP, Cal-B/C analysis

The cost effectiveness analysis found some variation in benefit-cost ratios by rail mode. From the mix of projects included in the analysis, intercity, commuter, and urban rail projects were found to have benefit-cost ratios of 3.5, 2.6, and 1.4, respectively. Based on these results, the most cost effective investments appear to be those with relatively low capital costs and those that benefit multiple rail services. Urban rail projects generally have higher capital costs related to having dedicated rights-of-way. Intercity and commuter projects often benefit from right-of-way investments made by other agencies and the private sector.

7.2 Service Efficiency and Effectiveness

This section examines service efficiency and effectiveness for intercity, commuter, and urban rail systems in California. The farebox recovery ratio (the ratio of fare revenue to operating expenses) of each California passenger rail operator was used as the key measure of service efficiency.

California rail services recover a reasonable portion of their operating costs. Commuter rail services recovered about 44 percent of operating costs from fares during 2000, while urban rail systems recovered about 47 percent. The national average for commuter rail and urban rail services was about 56 percent. However, national statistics are dominated by the New York Metropolitan Area, which relies heavily upon rail transportation and has the highest farebox recovery ratios in the country. The State-supported intercity rail and connecting bus services recover between 38 and 53 percent of operating costs from fares, with the highest recovery ratio occurring on the Pacific Surfliner.

For service effectiveness, ridership was compared to the level of service provision (in terms of rail vehicle miles) among passenger rail operators in California. Statistics were calculated using data from the National Transit Database (NTD) and Amtrak for the period from 1996 to 2000. In recent years, ridership has grown faster than the increase in the level of service. Passenger rail service grew about 25 percent in the past five years, while ridership increased about 35 percent. If this trend continues, it should improve farebox recovery ratios in California, but it may also lead to overcrowding.

APPENDIX A: LEGISLATION REQUIRING THE STATEWIDE RAIL TRANSPORTATION ASSESSMENT

BILL NUMBER: AB 1706

CHAPTER 597
FILED WITH SECRETARY OF STATE OCTOBER 9, 2001
APPROVED BY GOVERNOR OCTOBER 7, 2001
PASSED THE ASSEMBLY SEPTEMBER 14, 2001
PASSED THE SENATE SEPTEMBER 12, 2001

INTRODUCED BY Committee on Transportation [Dutra (Chair)], MARCH 7, 2001

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SEC. 26. (a) The Department of Transportation, in consultation with the Office of Planning and Research, shall conduct a statewide rail transportation assessment. The assessment shall be conducted in cooperation with regional and local transportation agencies and private freight railroads. The assessment shall incorporate both a passenger and a freight rail systems portion. The passenger rail systems portion of the assessment shall include intercity, commuter, and urban rail systems.

(b) (1) Based on the assessment, the department shall prepare a report. The assessment and report shall do all of the following:

(A) Examine how the different modes of rail transportation interconnect with each other and with other forms of transportation. The assessment shall investigate where there are gaps in connectivity between passenger rail systems. The report shall make recommendations for improving connectivity for passenger and freight rail.

(B) Identify where there are currently high levels of freight and passenger rail track congestion and where agencies project future rail congestion problems. The report shall make recommendations for capital projects that would alleviate or prevent the onset of track congestion.

(C) Report on plans for capital projects for each rail transportation agency, both public and private, over the next 10 years. Capital projects include improvements that enhance public safety, including, but not limited to, grade crossing separations, that increase track capacity, including, but not limited to, passing tracks or siding, and that increase passenger services, including, but not limited to, additional passenger cars and locomotives. The report shall identify where plans for capital improvements or services by one rail agency will conflict with plans for capital improvements or services with another rail agency.

(D) Examine the cost effectiveness of current funding for rail projects.

(2) Based on findings from the assessment described in subdivision (a), the report shall include an estimate, with documentation, of statewide unfunded capital and operating needs over the next 10 years for each rail transportation agency.

(c) The department shall submit the report required under this section to the Legislature on or before October 1, 2002.

BILL NUMBER: AB 2866

CHAPTER 127

FILED WITH SECRETARY OF STATE JULY 10, 2000.
APPROVED BY GOVERNOR JULY 8, 2000.

I am signing Assembly Bill No. 2866; however, I am concerned about several provisions contained in this measure.

Second, I am concerned about provisions included in this measure that would require an assessment of rail transportation in California and recommendations for projects. While I do not object to assessing the potential for greater connectivity of the passenger rail system with other passenger travel modes, improved public safety, and mitigating congestion on rail corridors providing passenger service, I am concerned with the bill's implication that the State should propose projects to support private freight rail capital needs.

While I recognize that movement of goods has a strong tie to the State's ability to support commerce, I also recognize that private, for-profit companies that operate freight railroads are substantially capable of funding their own capital and operating needs. I am directing the Department of Transportation to limit its rail recommendations to those which are the proper subject of State funding, prioritizing them in context of the State's other pressing transportation needs. Furthermore, I would support legislation directing the University of California to conduct the private rail assessment.

In contrast to the sweeping request for project recommendations in this bill, the Traffic Congestion Relief Plan I proposed contains funding for priority freight rail-related capital projects which will relieve congestion on highways and streets. Funds proposed for the publicly-owned North Coast Rail Authority will restore service thereby reducing the burden on Route 101. Funds proposed for an eastern extension of the Alameda Corridor project are based on the expectation that the freight rail company that participates in the Alameda Corridor project will contribute substantial funding, commensurate with the benefits it will obtain, while government funding is used substantially to reduce the conflicts between rail operations and street and highway traffic.

GRAY DAVIS, Governor

APPENDIX B: GLOSSARY

AC Transit	Alameda-Contra Costa Transit District
ACE	Altamont Commuter Express
ACTA	Alameda Corridor Transportation Authority
ATSF	The Atchison, Topeka and Santa Fe Railway Company
BART	San Francisco Bay Area Rapid Transit District
Bay Area	San Francisco Bay Area
BNSF	Burlington Northern Santa Fe Railway Company
Cal-B/C	California Life-Cycle Benefit/Cost Analysis Model
Caltrain	Peninsula corridor Joint Powers Board
CHSRA	California High Speed Rail Authority
Coaster	North County Transportation District (San Diego County)
CTC	California Transportation Commission
Department	California Department of Transportation
EIR	Environmental Impact Report
GN	Great Northern Railway
ITIP	Interregional Transportation Improvement Programs
LACMTA	Los Angeles County Metropolitan Transportation Authority
LAVTA	Livermore Amador Valley Transit Authority
Metrolink	Southern California Regional Rail Authority
MPO	Metropolitan Planning Organizations
MTA	Metropolitan Transportation Authority
MTC	Metropolitan Transportation Commission
MTDB	San Diego Metropolitan Transit Development Board
MUNI	San Francisco Municipal Railway
NCTD	North County Transportation District (San Diego County)
NWP	Northwestern Pacific Railroad
OPR	Office of Planning and Research
RIP	Regional Improvement Program
RT	Sacramento Regional Transit
RTIP	Regional Transportation Improvement Programs
RTP	Regional Transportation Plan
SMART	Sonoma-Marin R
SP	Southern Pacific Railroad
STIP	State Transportation Improvement Program
STIP	State Transportation Improvement Program
TCRP	Traffic congestion Relief Program
UP	Union Pacific Railroad Company
VCTC	Ventura County Transportation Commission
VTA	Santa Clara Valley Transportation Authority
WP	Western Pacific Railroad